THE MARINE REVIEW

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BIDS FOR BATTLESHIPS ASKED.

Bids are to be asked by the navy department at once for the construction of the two new battleships, Florida and Utah, the plans for which were accepted by President Roosevelt a few days ago The award will be made about Nov. 15.

In general the two new fighting craft follow the designs and armament of the North Dakota and the Delaware, the sister ships on which the President recently set the stamp of approval by declaring them second to nothing afloat. There are a number of changes made, however, which will represent the advance made in the art of shipbuilding in the short time that has elapsed since the plans for the North Dakota and Delaware were adopted.

The most radical departure from the older type is probably in regard to the engines. The older ships were equipped one with the reciprocating engine and one with a turbine. In the plans that have just been accepted the navy authorities and the President have decided definitely in favor of the turbine, and this type of engine will provide the motive power for both the new battleships.

The difference of opinion on the question of engines has long put the navy officials into two camps. The competitive tests planned by the Bureau of Steam Engineering between the scout cruisers Salem, Chester, and Birmingham was intended chiefly with a view to settling this dispute once and for all. The decision of the officials, however, to adopt the turbine in both vessels makes it apparent that the Birmingham, which fell two knots behind the other cruisers in her official speed tests, has caused the reciprocating engines, with which she was equipped, to be dropped from consideration.

It now rests between the Curtis or American turbine and the Parsons or English make, and perhaps some other types of turbine which may be offered in the bids.

In armament the newer ships will differ from their models simply in having 16 5-in. guns for torpedo defense instead of 14, and in having these "torpedo killers" of a newer and more powerful make. Additional protection in the shape of bulkheads will be provided around the uptakes of the new ships.

CABLE PLANTING VESSEL.

The new cable planting vessel which is under construction at Newport News for the quartermaster's department is to be one of the smartest vessels in the service. She is to be a twin-screw, ocean-going, steel steamer for submarine cable service under the signal corps, being sailed and managed by the quartermaster's department. She will be 160 ft. long, 32 ft. beam and 9 ft. 6 in. draught and will have a speed of 13 statute miles per hour. She is to be completely equipped with all modern appliances for the handling and laying of cables. The vessel is to be completed in about a year and will be named in honor of Joseph Henry, the famous secretary of the Smithsonian Institution.

The Japanese government arsenals are at present building three destroyers and two battleships, the latter displacing 20,000 tons each. It is interesting to note that since the ship building encouragement law went into operation in March, 1896, the steamers built or in course of construction at dock yards in Japan under the subsidy granted in pursuance of the law number 88, having an aggregate tonnage of 200,900. Of this total 76 steamers, aggregating 167,746 tons, have already been completed.

SURVEY OF THE PACIFIC.

There is considerable rejoicing on the Pacific slope over the fact that on the completion of the magnetic survey of that ocean which is now being made by the sailing yacht Galilee under the auspices of the Carnegie Institution, navigation in those waters will be rendered much more accurate. Since August, 1905, the Galilee has traversed the north and south Pacific oceans a number of times, covering nearly 70,000 miles. Among the discoveries made by this vessel was that along such a well traversed route as that between San Francisco and Honolulu there were magnetic errors of from one to two degrees on the best of charts, while in other regions the errors amounted to three and even five degrees. In Alaska, at Treadwell Point, near Juneau, a study was made of a local magnetic pole that presents many anomalous features and exerts a local magnetic attraction which affects the compasses of ships in the channel a mile distant by about eight degrees. Already the work of the Galilee has resulted in a new chart issued by the United States Hydrographic Office, giving the lines of equal magnetic variation for 1910, which is considered a decided improvement over previous charts. The hydrographic office has also in preparation charts showing the lines of equal magnetic dip and equal magnetic intensity, both based largely on data supplied by the institution. A complete survey of the Pacific ocean is greatly needed. Much has been done in this line, but far more remains to be done.

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EARLY DAYS ON LAKE SUPERIOR.

C. T. Harvey, who built the first canal at Sault Ste Marie, recently related to *The Mining Journal*, of Marquette, a story of an early day fishing trip in Marquette county.

"I came to Lake Superior," said he, "in June, 1852, recovering from a typhoid fever so severe that if my nurse had slept five minutes longer one night I would have 'crossed the bar.' Only most energetic restoratives brought me back to life. The sensation of quitting it I have vivid recollections of to this day.

"My recovery was slow and when I reached the shores it was an effort of half a day to write a one-page letter. The effect of this climate in my case was marvelous. After a few weeks stay at the Soo I came here on the propeller Manhattan, Captain Spalding, I believe, and found lodgings with Mr. and Mrs. A. R. Harlow, who occupied the only two-story frame house then to be found in Marquette. It stood on the lake shore, a few rods west of where Spear's warehouse is now located. The second story was not partitioned off except with blankets, which served instead of lath and plaster.

"Soon after I arrived I joined a party proposing to visit the Jackson mine, then the only one opened, and to have some trout, fishing both ways. I remember Isaac Hewett and Richard Parsons, both of Cleveland, as two of the party, and that we engaged S. L. Barney, now living in this city, to take us with a two-horse team to the Jackson forge location, where we were to spend the night. It took us most of the day to get to the forge, but trying the fishing on arrival we soon had a fine string of speckled trout for supper. There being no family then on the location the question arose as to who should act as cook. I volunteered to do so, if I could name my assistant, who was to wash the dishes, etc. This was agreed to, and Mr. Parsons was named by me. All saw the joke, because he was known as the most prominent fashionable society young man in Cleveland, had lately opened a law office and afterwards was a member of congress from that city, also United States marshal for the District of Columbia, if I remember aright. He had never been in the woods before and on that day wore a suit of finest broadcloth, cut in the extreme of the fashion. He carried out the program assigned to him in good faith, and watching him clean up the table and dishes made lots of fun for the party.

"Next day Mr. Barney returned to Marquette with the team, while we walked to the Jackson mine and saw the first opening of a Lake Superior iron ore vein on the side of the hill, about the size of an ordinary bed room, and where the hard specular ore shone like silver, the appearance of which impressed me greatly.

"After lunch we started to fish down the Carp river, expecting to reach the lake, reported as twelve miles distant, before sundown. The trout were plentiful and I became so much interested in the sport that I fell behind the main party. Finally when I had a string slung around my shoulder as heavy as I could comfortably carry I noticed that the sun was getting low and my calls brought no response from the party ahead. I pushed on down the stream until dark and then, feeling my way with my fish pole, was dumped into a pool, fortunately not over my head in depth, out of which I pulled myself. I then gave up further progress and sat on a log until daylight, wet down by a shower of rain, but kept wide awake by noises about me suggestive of bears.

"In the morning I started again and reached the lake about ten o'clock. The thickets had taken toll of all my fish. My hat and shoes were gone and my clothes hung in ribbons about me. In this plight I crawled into an Indian wigwam near the mouth of the Carp. I wrote a note to Mrs. Harlow, on birch bark, attaching the key to my trunk, asking her to obtain a full suit of clothes, with shoes, and send them to me by the Indian boy I sent as messenger. In due time he returned with the needed articles, which I utilized forthwith, leaving the remainder of my fishing garments in settlement for the exclusive use of the wigwam while making my change of apparel.

"About noon I appeared at the Harlow house, where Mrs. Harlow met me and shook me by both hands in token of her joy in seeing me safe again. When the Indian boy arrived with my note a searching party was being formed to look me up, the fear being that I had forsaken the stream and was lost in the woods. After that for a full half century whenever Mrs. Harlow and myself met we always exchanged greetings with a double hand shake, in memory of that morning.

"Dick Parsons, as he was known, had left on a steamer that morning before my return and we did not meet again for over forty years. When in Cleveland some ten years ago I learned that he was an invalid at his residence on Prospect street and called on him. We referred to that Marquette fishing trip which he said he remembered very distinctly. Telling of my experience with my fishing garments, I asked him how his elegant suit fared. 'Oh,' said he, 'when I got back to the boarding house, thankful that it was too dark for any about town to see me, I kicked the suit under the bed and it was there when I took the steamer next morning to return to this city.' Thus we have an example of the fun of fishing in early days, when speckled trout were seldom disturbed in their native pools and early date visitors to their region were green."

GHENT A SEAPORT.

The works which have in late years been carried on toward the improvement of the Terneuzen canal are advancing rapidly and the canal connecting Ghent with the North Sea will be completed about the beginning of next year. On Dutch territory the work has lately been pushed with great activity so that the greater part thereof is completed. The last contract for deepening and improving the harbor of Terneuzen, the Dutch end of the canal, was signed and passed by the Dutch authorities Dec. 18, 1907, and provided that within 300 days the new maritime lock at Terneuzen, fitted with machinery permitting the temporary working thereof by hand, be opened to vessels. When this lock is completed it will be worked by electricity. The existing locks permit the passing through into the Terneuzen canal of vessels of not more than 17 ft. draft, while the new lock will permit the safe passage of vessels of 25 ft.

The dimensions of the new lock will be 459 ft. long, 59 ft. wide, and 17 ft. deep at low tide. The bridges on the canal will be opened and closed by electricity, while the total distance of 20 miles separating the port of Ghent from the sea will be fitted with electric arc lights placed at intervals of 490 ft. The narrowest part of the canal is 220 ft. at the surface of the water and 78 ft. at the bottom. The depth is 28½ ft.

The length of the canal improved will be 20 miles; 10½ miles on Belgian territory and 9½ miles on Dutch territory. The total width over water line on Belgian territory will be 318 ft., while at the bottom the width will be 78 ft. with a depth of 28½ ft. The width over water line on Dutch territory will be 220 ft. with 78½ ft. at bottom and the same depth.

Commercial docks will be provided with wharfage facilities of a total length of 5,250 ft., with nine sheds. The depth varies from 17 to 21 ft. Lumber docks will have 919 ft. of wharfage, 278 ft. wide, with three sheds covering 83,292 sq. ft. The "foreharbor" will have 7,215 ft. wharfage, 295 ft. wide, and a depth of 21 ft.

The Terneuzen canal when com-

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pleted will permit the safe entry of large trans-Atlantic cargo boats. The city authorities are informed that as soon as the improvements are completed a new line of steamers will ply from Ghent to Galveston.

RAILWAYS WANT PUGET SOUND TRADE.

It is perhaps little known that there are more miles of railway projected or under consideration in the state of Washington than in any other state in the union, while Oregon, Idaho, Montana and the other northwestern states are receiving a proportionate amount of trackage. In Canada a like situation is revealed by the laying down of 4,000 miles of steel rails.

Seattle is the objective point for most of these lines, as the Alaska-Yukon-Pacific exposition is to open there in June of 1909. It is expected that by that time the Chicago, Milwaukee & St. Paul Railway Co. will have completed its extension from Chamberlain, S. Dak., a distance of over 1,000 miles, while the Harriman lines are building north from Portland, Ore., to Seattle, where terminal facilities have been acquired at a cost of $15,000,000.

The Canadian Pacific is not to be outdone and in retaliation for the Great Northern's having invaded Canadian territory the former is preparing to build a line across the state of Washington from Spokane to Puget Sound and thence northward to its present terminus at Vancouver, British Columbia. The North Coast Railway, which is a mystery as yet unsolved, covers 644 miles with its trunk and branches, and is to connect Spokane and Seattle. It is not known definitely whether this is the Canadian Pacific company's project in disguise, or whether it is being put through by the Chicago & Northwestern. Other new lines of less prominence are under way, including the North Yakima & Valley, another unknown project, reaching from North Yakima to Tacoma, and now partially completed.

The Northern Pacific and Great Northern railways are engaged together in the construction of the Spokane, Portland & Seattle, which will add much strength to the Hill lines.

It will thus be seen that the long established monopoly of the Hill interests in the boundary territory and in Puget Sound traffic promises to be somewhat shattered by the active competition to which it is to be subjected by the Milwaukee, Harriman, Canadian Pacific and other lines.

The commerce of the northwest and particularly of the state of Washington is well worth fighting for, as the state is developing more rapidly than any other in the northwest. She now has a population of 1,125,000 people. Her wheat yield is worth $40,000,000 a year, and her timber $85,000,000. Her fish mean $15,000,000 annually, her coal $10,000,000, and her Alaska commerce $21,000,000. Seattle, with 275,000 people, has a port commerce of $140,000,000. The commerce of Puget Sound with China, Japan, Siberia, the Philippines, South America, Australia and Europe is reaching momentous proportions. For the last fiscal year it was a trifle less than $70,000,000, with exports nearly double the imports. A ship sailed from Seattle the other day loaded solely with grain reapers to be used on the expanding wheat fields tributary to Vladivostok. Alaska has sent to the Seattle assay office almost $175,000,000 in virgin gold.

Puget Sound, nearer the Orient by several hundred miles than the California ports, boasts a larger foreign trade than the Golden Gate. For years and years to come, if not for always, Alaska, with its area as big as our four largest states, must buy and trade and travel through Puget Sound. But to the railways the most attractive prize for immediate profit is the timber of the western slope.

After the merchantable trees of every other part of the United States fall, forests will stand on the north Pacific coast. Fast as is the western timber diminishing, decades must pass—yes, scores of years—before it is gone. With the northwest the only source of supply, all the country will need the timber that comes from the tall fir trees. Mr. Hill has remarked that an acre of timber at the first cutting produces more freight than an acre of wheat cultivated for 40 years. President A. J. Earling, of the Chicago, Milwaukee & St. Paul, has said that if he can haul over his new road to the coast four trainloads of lumber a day the entire operating expenses of the line will be paid. Under normal conditions the lumbermen assert that they more than pay for the operation of the Northern Pacific, which now carries two-thirds of their eastern shipments.

ENGLAND'S DREADNOUGHTS.

In 1910 England will have eight battleships of the Dreadnought class in commission. Before the close of this year two more will have been launched and work on another will have been begun. These vessels are all of the improved Dreadnought type, embodying the changes which were adopted after the exhaustive trials of the first of the class.

The St. Vincent, which was laid down at Portsmouth in December last, is to take the water on Sept. 10, and the Collingwood, now building at Devonport, on Nov. 7. It was intended to launch the Collingwood, which was commenced in February, in September, but it was found that the slip on which she is being built is so completely equipped for the handling of material that up to a certain stage new construction can be carried on more expeditiously and economically than is possibly when the ship is afloat. Both the Collingwood and St. Vincent are to be ready for commission early in 1910.

The Vanguard, the next ship of this type, is to be commenced shortly by a private firm of shipbuilders. The contract for the Vanguard was delayed pending the decision of The Hague conference on the limitation of armaments, nearly a year thus being lost. It is intended, however, to make up as much of this time as possible by rushing construction.

The slip which the St. Vincent vacates at Portsmouth is to be prepared for the laying down of another Dreadnought in January, and the Collingwood's slip at Devonport will take the keel plates of an armored cruiser, which is to embody improvements in the Invincible class. One of these improvements relates to the turbines, and is a discovery made on the Dreadnought, whereby that vessel's speed was accelerated.

Great Britian will therefore very soon have four Dreadnoughts in commission, two completing, and two building. The progress made in the provision of this most formidable of fleets is shown in the following table:

	Laid Down.	Launched.	Months B'lding.
Dreadnought	Oct., '05	Feb., '06	4
Bellerophon	Dec., '06	July, '07	7
Temeraire	Jan., '07	Aug., '07	8
Superb	Feb., '07	Nov., '07	8
St. Vincent	Dec., '07	Sept., '08	8
Collingwood	Feb., '08	Nov., '08	9
Vanguard	1908		
Another unnamed.	Jan., 1909.		

Bids opened on Aug. 5 by Dock Commissioner Spooner on the first contract for developing the South Brooklyn water front and providing a system of municipal docks to be second to none in the United States, were as follows: John A. Seely, 32 cents per cubic yard, and the Morris Dredging Co., 46.8 cents per cubic yard. This contract provides for the dredging of about 4,200,000 cu. yds. along the water front between Twenty-eighth and Thirtieth streets, and the estimated cost is about $2,000,000.

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LOWER RATES REFUSED.

Mr. C. C. McCain, chairman of the Trunk Line Association, recently furnished for publication a reply to the petition of the steamship interests of the various Atlantic ports for a lowering of railroad rates on grain so as to permit the continuance of the grain business through to the Atlantic seaboard. The communication, which is addressed to Mr. Lawson Sandford, secretary of the Trans-Atlantic Associated Freight Conference, New York, is as follows:

Dear Sir—Referring to your communication of July 27 transmitting petitions of the various trans-Atlantic lines leading from Boston, New York, Philadelphia and Baltimore, in which appeal is made to the railroad companies operating from Lake Erie ports to the Atlantic ports named for a reduction in the rates on grain consigned for export to meet the competition through the port of Montreal.

In accordance with our request that your interests appoint a committee to confer with representatives of the interested carriers on the matters submitted, Mr. A. C. Fetterolf and Mr. W. G. Sickel, representing your companies, attended meeting of the Traffic Managers' Committee of this association on Aug. 6, and made oral statements in support of the petitions. Mr. F. H. Price, export agent of the Millers' National Federation, was also in attendance to urge a continuance of the existing parity as between grain and flour rates.

Since the conference very full consideration has been given the subject and the views of the railroads, together with their conclusions, will here follow, which I am directed to transmit at somewhat greater length than would ordinarily be necessary were it not evident that the publicity which has been given the petition, and the question generally has laid upon the railroads a measure of responsibility for the decline in exports at New York and Boston, as well as an implied indifference to the welfare of the commercial and steamship interests engaged therein.

Reviewing the petitions the following statements are observed:

1. Attention is directed "to the unreasonable rates demanded by them on export grain from lake ports to the seaboard as compared with the rates that are being accepted by the railroad companies from the lake ports to Montreal."

2. The present situation is a deplorable one for which you are responsible and is killing the steamship business from the four ports named.

3. Montreal is not only loading their regular tonnage, but the favorable grain rates from that port are attracting tramp steamers in addition to the regular lines.

4. Comparison is presented of the rate of 5½ cents from Buffalo to New York versus the rate from Georgian Bay ports to Montreal of 3½ cents, which condition, it is stated, has benefited Montreal and deprived American ports of practically any grain during the corresponding period.

It is noticed that no reference is made to the low rates of the all-water routes from Chicago, Duluth and Fort William to Montreal. In other respects it is felt that these statements do not accurately present the competitive conditions and are unjust in their intimations of apathy and implied neglect on the part of the railroads to afford all reasonable protection to the export business of the ports which they serve. Exception must be taken to these assertions as they wholly misrepresent the position of the railroads upon a matter which is manifestly quite as important to them as to the steamship interests. The facts are that the situation at Montreal since the opening of the present season of navigation has had constant attention and been repeatedly considered with a view to determining what appropriate action might be taken and what changes in rates could be consistently made in order to retain to the American routes and posts their equitable share of the traffic in question.

The competition of the Montreal routes as ascertained and understood by the railroads, is as follows:

Under normal conditions the rates from Georgian Bay ports to Montreal on export traffic bear a specified relation to the rates charged from Buffalo to the Atlantic ports. These, combined with the charges for lake transportation from Chicago, Duluth, etc., produce certain through rates to Montreal and New York, which approximate a recognized relation in the through rates to those ports. This season these normal conditions have been disturbed by the low rates charged by the all-water routes operating from Chicago, Duluth and Fort William to Montreal. This service has been greatly increased, competition has been keen, and the rates have been demoralized. The charge of 3½ cents per bushel from western lake ports to Montreal is quite out of proportion with the rates these carriers would receive when engaged in the service from Chicago, Duluth or Fort William to the Georgian Bay ports and about one-half the rate which ordinarily prevails for the through water and rail service from Chicago via the Georgian Bay ports to Montreal.

The general depression in lake traffic has diverted independently operated lake vessels from their customary service between upper lake ports to the longer routes to points of trans-shipment on the St. Lawrence or to Montreal direct. With the expected increased fall movement of grain, many of these vessels will find it more profitable to confine their service to and from Chicago, Duluth and Fort William and Georgian Bay ports.

The rail lines operating from Georgian Bay ports to Montreal have not shared in the business since the introduction of low all-water rates. They are suffering from this competition, as well as competition on westbound traffic, which is being carried by the water routes in greater quantities than heretofore and at exceedingly low rates. Both kinds of competition are seriously felt by the American routes. The lake and rail routes via the Georgian Bay ports having been obliged to retire from the grain business, are arranging their rates in anticipation of an increased movement of the new crop and have announced that, effective Aug. 28, their rates on wheat will be 5½ cents per bushel from Georgian Bay ports to Montreal.

It is ascertained that there is no increase in the regular ocean fleet operating from Montreal because of this increased movement of grain to be exported; the usual fleet carrying all the grain offering and at lower charges than were in effect at the same time last year. There have been two or three sailings from Montreal by tramp vessels, but this is not regarded as unusual. The tonnage of wheat exported for the months of May, June and July, 1907 and 1908, from the various ports, is as follows:

	1907. Bushels.	1908. Bushels.
New York	5,843,244	3,248,035
Philadelphia	1,590,086	2,557,225
Baltimore	412,000	2,486,799
Boston	562,186	434,207
	8,407,516	8,726,266
Montreal	7,767,045	10,891,303
Total	16,174,561	19,617,569

The foregoing shows that the increase of exports, via Montreal, was equivalent to the total increase. It is also noted that the American ports, as a whole, have not lost traffic—the decline at New York and Boston being more than equaled by the increases at Philadelphia and Baltimore.

It is proper to state, for your information, that when considering a proposed revision of rates on important traffic, attention must be given to the established rate relations as between various points in order that intended changes will not disturb the usual parity in rates as between such points.

It is a fundamental principle in rate construction that certain different relations in charges between localities commercially competitive, as well as between charges on analogous or dependent articles, shall be maintained. Under this principle grain exercises a more extended influence than any other one commodity transported. The rate on grain from Buffalo to New York is applied as a basis

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for rates to other Atlantic ports and prescribes the rates from other lake ports. A certain parity must be observed as between domestic and export rates. The rate from the lake ports employed in connection with the water rates from Chicago, Duluth, etc., produces a through charge from the latter points which govern the rates which may be charged by the all-rail routes from Chicago. The latter, in turn, is applied as a basis for rates from the Mississippi river, St. Louis and points throughout Illinois, Indiana and Ohio to the Atlantic seaboard. It will therefore appeear that any material reduction in the rates at and east of Buffalo on export grain would, at once, create new rail-and-water rates from Chicago and enforce a revision in the rate of the all-rail routes from the territory indicated. If such changes were made with respect to export grain, the rates on domestic grain may become involved and require adjustment in order to retain the normal parity.

The relation as between the rates on grain and dependent commodities must also receive attention.

Established custom, as well as certain legal requirements, makes necessary the observance of definite relations as between the rates on grain and grain products. The rates on flour from Buffalo, St. Louis, Chicago and Minneapolis are arranged with regard to the grain rates therefrom. Rates on cereals from Ohio and Indiana points are dependent upon the grain and grain products rates from Chicago. Minneapolis and other Northwestern milling points find their flour rates to the seaboard based upon the flour rates from Chicago and Duluth, each of the latter being established with regard to the grain rate from Chicago.

The foregoing is a brief recital of the ramifications of the grain rate structure and its influences, with most of which your interests are no doubt quite familiar. All may be summarized by the statement that a material change in the rates on export grain from Buffalo to New York will necessitate reductions in the rates on all export shipments of grain, flour and other articles which are governed by these rates, and such changes would affect the extended territory indicated herein throughout which this traffic originates. The rates on domestic traffic would be similarly involved.

Formerly the at and east export grain rates from Buffalo were from time to time changed independently of other rates. The necessity of observance of regulative requirements and the prevention of possible discriminatory conditions with respect to the relation in charges as between various localities as well as between competitive commodities renders necessary a closer adherence to the application of the principles of rate construction described herein.

The direct matters to be determined by the railroads in this connection are as follows:

1. Shall they reduce their present reasonable and lawfully related rates on export grain to meet the competition of all-water routes to Montreal which are uncontrolled by any regulative authority at liberty to charge what they please, and prepare to carry grain traffic at little or no profit, in order to secure return cargoes which offer some slight margin of profit?

2. Would a reduction in such rates under all the circumstances divert a substantial quantity of traffic to the Lake Erie gateways?

3. Is a reduction justified in view of the influence of the export grain rate upon the rates of other important traffic?

As a result of the very thorough consideration which has been given the entire matter, the interested railroads do not find that the conditions justify a reduction in the export grain rates at this time. The principal controlling reasons leading to this conclusion may be stated as follows:

1. A reduction in the rates east of Buffalo necessary to equalize the rates of the competitive all-water routes leading to Montreal would result in rates wholly unremunerative.

2. The railroads are without evidence or assurance that a reduction to the extent proposed will result in an increased movement through the Lake Erie gateways. That such a reduction would not add to the volume of this traffic is in accordance with the views of representatives of the New York Produce Exchange, expressed at a recent conference with the officers of the railroads, when it was stated that no assurance in this connection could be given, but it was assumed that somewhat lower rates, together with the more convenient business facilities at New York, would, no doubt, result in an increased tonnage through that port.

3. The effect of the proposed reduction upon other rates and traffic, as indicated above, would result in serious loss of revenue which could not be regained by any probable increase in export grain shipments.

4. The conditions under which the increased movement to Montreal has taken place are regarded as abnormal and temporary, and it is believed the normal status will be resumed with the beginning of the movement of the new grain crop when shipments by lake will be more distributed between the various lake ports and less concentrated on Montreal, and the American Atlantic ports will again receive their customary quota.

In addition to the foregoing, all material matters bearing upon the proposition have been fully considered in arriving at these conclusions and the railroads were at all times cognizant of an obligation to do their full share toward the retention of an equitable proportion of the export grain to the American ports. The view is held with respect to an emergency proposition of this character that a partnership interest should exist as between the railroads and the steamship lines. This, however, is not manifest in the present instance, as it is not understood that any reduction in the current ocean rates from New York or other ports is contemplated by reason of the present necessities. The steamship lines have elected to protect their interests by the withdrawal of service from New York to certain foreign ports, which action may have to some extent stimulated the movement from other ports. A similar course is not available to the railroads when insufficient and unprofitable traffic is offered.

The present ocean rates may be regarded as low as could be reasonably made, yet, it is observed that the rates from Montreal are lower than last year, while advances have been made from New York to foreign ports not served from Montreal. A lower inland rate to New York would afford opportunity for further advances to such points and this suggests, as has been noticed in the past, that reduced inland rates and slightly increased tonnage offerings are conducive to higher ocean rates. It would, therefore, appear that the reduction now desired is expected to be borne entirely by the railroads, permitting them to be the sole benefactors in relief of the conditions complained of.

The railroads cannot refrain from observing that the petitions have evidently, and very naturally, had origin in the thought of self-preservation and quite overlook the consequences to the railroads, and did not emanate from the broader view of co-operative action for the joint interest of the ocean lines, railroads and the American ports. This leads to a further and more general observation suggested by the proposition, as well as other constantly increasing demands upon the transportation interests.

There is a widespread matter-of-course belief that there are no business ailments which are not in some manner attributable to the practices or charges of the railroads and they, therefore, must furnish the remedy. This in the majority of instances they ultimately do, either from a semi-compulsory business expediency or as a result of being haled before commission or court—the facilities for such procedure being now most convenient and inexpensive. No corresponding

(Continued on page 19.)

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ITEMS OF GENERAL INTEREST.

The New York Central railroad has announced that work will at once begin on the construction of four water terminals at East Boston, Mass., to replace those burned last month. The reconstruction will begin with the building of a new pier for the use of the Cunard Steamship Co., followed by one for the Leyland Line, each of which is to be 780 ft. in length and 250 ft. wide. Following these a pier will be built on the site of old Pier 6. A grain elevator with a capacity of 1,000,000 bu. will complete the work.

Three of the battleships attached to the Pacific fleet have established new coaling records recently. On June 12 the battleship Georgia took aboard 1,779 tons of coal in five hours twelve minutes, an average of 342 tons per hour. On June 22 the battleship Rhode Island took on 1,710 tons in 4 hours 47 minutes, an average of 357.7 tons per hour. Both these records have been eclipsed, however, by the battleship Virginia on June 26, when 1,667 tons were taken aboard in the record time of 4 hours, an average of 416.7 tons per hour. The Virginia also made the best hour record of any of the ships, taking on 555.9 tons during one of the four hours.

The reports of Suez canal traffic for the year 1907 have recently been made public and show that traffic through that important waterway is still on the increase, the total net tonnage for the year being 1,282,930 greater than that for 1906. The five leading users of the canal were United Kingdom, Germany, France, Holland and Austria-Hungary with tonnages in the order named. Notwithstanding the reduction in transit dues which took place on Jan. 1, 1906, the revenue continues to grow. Last year's increase of £320,000 is attributed not to any abnormal causes, but to the general activity of trade which prevailed.

During a heavy gale on the night of Aug. 5 the steamers Western Star and Crete ran aground in the inner harbor near the lighthouse pier, Buffalo, where they had been put in ordinary during the week previous. It is believed that no damage has been sustained.

A report issued recently by the Association of Hamburg Shippers on the commerce of that port for the year ending June 30, 1908, states that the year was a very bad one and the companies which had increased their tonnages during the late prosperous time were obliged to lay up a great number of ships. The high prices of coal and labor have also had a depressing effect and the lines to North America suffered through the decrease in emigration. The goods traffic with South America fell off owing to the low price of corn and the bad state of the wool market in Argentina, the low rubber prices in Brazil and the fall in the value of Chilian currency. Traffic with the far east and the Levant is described as being hopelessly bad.

Admiral Dewey sailed Aug. 22 on the Dolphin for a cruise along the New England coast. He is to attend the exercises at the unveiling of a bronze plaque on the house in Portsmouth, N. H., in which Admiral Farragut died, and on Aug. 28 he will attend the regular meeting of the general board at Newport and the conference of naval officers there engaged on the plans for the new battleships. Admiral Dewey has not hoisted his flag for several years, the last occasion being the cruise of the general board to Guantanamo in 1905.

The navy department is about to provide the naval station at Guam with permanent facilities for maintaining an adequate channel in the approach to that station. This work has previously been ineffectively attempted by the use of drags and it has now been decided to provide Guam with a permanent dredging plant which is to be so constructed that it may be used as a derrick. The dredger will be equipped with a yard orange-peel and clam-shell bucket.

The Pittsburg & Cincinnati Packet line, one of the largest transportation companies operating on the Ohio river, has become insolvent and is in a receiver's hands. The failure was caused by the inability of the company to operate its steamboats profitably on the prevailing low water.

Bids recently opened in the office of the state superintendent of public works at Albany, N. Y., for improving the Erie canal at Little Falls, the modification of the dam and the construction of guard gates at Rocky Rift, were as follows: Casey & Murray, Rochester, N. Y., $829,770; Fidelity Construction Co., Detroit, Mich., $837,989; Coast & Interior Construction Co., Fayetteville, Ind., $881,318; John Pierce Co., New York, $864,655; Williams Engineering & Construction Co., New York, $850,594.

The new torpedo gun which Lieut.-Commander Cleland Davis, U. S. N., has invented was given a test at Fort Strong, Boston harbor, recently, in which three projectiles were fired, each of which overturned the target. Ordnance experts of the army and navy have expressed themselves as well satisfied with the merits of the new torpedo, which is a combination gun and projectile in itself, effective at 5,000 ft. and having its own motive power. The projectile is in two parts, is 45 centimetres in diameter and 5 metres long. The outer tube is about two-thirds the length of the inner torpedo and behind the torpedo proper is about 40 lbs. of high explosive. When the nose of the projectile comes in contact with any obstacle which stops its progress, the concussion, no matter how slight, detonates the 40 lbs. of explosive. The explosion drives the projectile through the object struck and at the same time starts a time fuse that causes the torpedo proper to explode a few seconds later.

According to the tabulation made by the German Navy League in its August leaflet, the Japanese navy will rank third in the navies of the world in 1911. The information given by this publication is prepared by specialists and is often derived from official sources. It is stated that the Japanese naval program of 1907 appears to provide for more tonnage than has ever been reported, including besides the three battleships Aki, A and B, and the four armored cruisers Kurami, Ibuki, E and F, the construction of four additional battleships of 20,800 tons, and of five armored cruisers of 18,500 tons each.

During the six months ended June 30, 1908, the total number (provisional) of passengers that left the United Kingdom for places out of Europe was 174,556, as compared with 319,917 during the corresponding period of 1907, and the total number (provisional) that arrived in the United Kingdom from places out of Europe during the first six months of 1908 was 189,667, as compared with 127,800 during the corresponding period of 1907. The balance of the total movement shows that the number of passengers that arrived in the United Kingdom from places out of Europe exceeded the number of passengers that left the United Kingdom for places out of Europe by 15,111 during the first six months of 1908; during the corresponding period of 1907 the number of passengers that left the United Kingdom for places out of Europe exceeded the number that arrived in the United Kingdom from places out of Europe by 192,117.

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(Continued from page 17.)

tribunal is available to the carriers for relief from any affliction which may befall them. They are confronted with innumerable demands for cheaper transportation, and encumbered with an enormous expense to meet the regulative requirements of the various laws and commissions. These, and other newly imposed expenses, together with the great increase in cost of direct operation have brought upon these interests an exceedingly burdensome situation.

Under existing conditions the railroads feel that they must approach any proposition looking to a reduction in rates with the greatest deliberation. It has been their experience in recent years where rates were reduced to meet commercial or other emergencies and were thereby made lower than an amount which could have been justified as reasonable, that such lower figure has come to be regarded by the shipping public as the measure of remunerative charge, and has similarly influenced the minds of regulative bodies, and it has been with the greatest difficulty that they were advanced to the former higher and entirely reasonable amount. In fact, there are many instances where low rates brought about by the conditions indicated are still in effect. The railroads must, therefore, proceed cautiously with these questions if they are to secure earnings commensurate with improved service and increased cost of operation.

These views are stated in order to apprise your interest of the conditions that at present confront the management of the railroads, but should in no measure be assumed to indicate an indifference on their part to co-operate to the fullest extent with the commercial and steamship interests in any reasonable undertaking which the exigencies of business may demand looking to the preservation of the export traffic to the American ports, provided this can be accomplished without impairment of existing necessary rate adjust-revenue. Very respectfully,

(Signed) C. C. McCAIN, Chairman.

TORPEDO BOAT DESTROYER BIDS.

Bids opened by the secretary of the navy at Washington on Sept. 1, for furnishing torpedo boat destroyers for the United States navy, were as follows:

The Bath Iron Works, Bath, Me., in Class 1, government specifications, proposes to build two vessels with a speed of 29½ knots to $644,000 each, to be completed in 24 months. In Class 2, bidder's specifications, two vessels with a speed of 30 knots are offered at $597,000 each, one to be completed in 21 months and the second in 22 months. A second proposal is for the construction of two vessels of 7,000 tons displacement and 30½ knots speed for $564,000 each, to be completed in 20 and 21 months respectively.

The Maryland Steel Co., Sparrow's Point, Md., submitted a bid for the construction of two vessels with a speed of 29½ knots for $708,000 each, to be completed in 24 months, or three vessels at $703,600, all to be completed in 24 months.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., proposes to build, under government specifications, two vessels with a speed of 29½ knots for $620,000 each, to be completed in 24 months. Under bidder's specifications they would build two vessels with a speed of 31 knots for $648,000 each, to be completed in 24 months.

The Fore River Ship Building Co., Quincy, Mass., would build under government specifications, two vessels with a speed of 29½ knots for $610,000 each, to be completed, the first in 23 months and the second in 24 months. Under bidder's specifications this company submits four different proposals. First the construction of two vessels with a speed of 32 knots at $638,000 each, to be completed in 23 and 24 months respectively. Second, two vessels with a speed of 33 knots at $688,000 each, to be completed in 23 and 24 months respectively. Third, two vessels with a speed of 32 knots for $665.000 each, to be completed in 23 and 24 months respectively. Fourth, two vessels with a speed of 29½ knots at $624,000 each, the first to be completed in 23 and the second in 24 months.

The New York Ship Building Co., Camden, N. J., would build under government specifications, two vessels with a speed of 29½ knots, at $665,000 each, to be completed in 24 months. Under bidder's specifications it would build two vessels of 30½ knots speed at $685,000 each, to be completed in 24 months.

The William Cramp Ship & Engine Building Co., Philadelphia, Pa., proposes to build, under government specifications, two vessels with a speed of 29½ knots at $669.000 each, to be completed in 24 months. Under bidder's specifications it would build two vessels with a speed of 30 knots for $664,000 each, to be completed in 24 months.

The torpedo boat destroyers will be of 742 tons displacement and will have a minimum speed of 29½ knots, will be equipped with oil-burning engines, and exclusive of armament are to cost not more than $800,000 each.

RESULTS OF SHIPPING CONFERENCE.

The transactions of the conference of Atlantic shipping interests held recently in London are now becoming known and it appears that all points of difference were satisfactorily adjusted with the exception of the main one—the Italian emigrant situation. As the Italian lines have raised the cry of "Italian emigrants for Italian ships," there promises to be considerable dissension between the Italian lines and those which already have rights in this traffic, such as the Cunard, White Star, Anchor line, Hamburg-American and North German Lloyd. These lines have done much to bring this business to its present state of development and it is not probable that they will retire without protest.

The fact that there is at present practically no emigrant traffic to the United States is probably responsible for no agreement having been reached, but it is pointed out that the southern states have been making an increased demand for imported labor, and especially for Italians, and as that traffic promises to grow rapidly it is not unlikely that the British and German lines would be willing to contend for it even to the length of inaugurating a rate war.

The Italian interests are believed to have in mind the draining of a considerable portion of Europe of its emigrant traffic by securing advantageous railroad rates, thus detracting from those lines which operate from North Sea ports.

It is probable that no decision will be made until there is revival in trans-Atlantic passenger business and as the companies can ill afford to be drawn into a costly rate war after such depression as now exists, it is not unlikely that the decision will be a peaceable one.

FAST WORK ON THE ISTHMUS.

The report of the chief engineer of the Panama Canal commission for the month of August shows that 1,963,814 more cubic yards of earth were excavated than during the corresponding month last year. The total excavation for the month was 3,252,506 cubic yards. As there has been an unusually large rainfall the work of recent months has been done under very unfavorable conditions.

A new record has been established for the voyage from Cherbourg to New York by the steamship Kronprinzessin Cecilie, which arrived in New York recently after having made the run over the short course, of 3,049 miles, in 5 days 11 hours, and 9 minutes, at an average speed of 23.25 knots. The best previous record, made by the Hamburg-American liner Deutschland, was 5 days, 11 hours and 54 minutes.

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AMERICAN SHIPPING.

Myron T. Herrick, former governor of Ohio, in addressing the Tippecanoe Club, a Republican organization of Cleveland, upon his return from Europe last week, declared in favor of government aid to shipping. It so happened that he went to England on the Mauretania and returned on the Lusitania, the two highest examples of the ship builder's art afloat. Naturally the former governor was impressed with these ships. Naturally also he could not help regretting that similar ships were not being built in the United States and owned by Americans. He was frank enough to say so. He could not help thinking what benefit it would be to American labor if such ships were built and manned by Americans. He related to his audience that these two ships had been built by government funds, the British government loaning the total amount to the Cunard company at 2¾ per cent interest and granting to the line a sufficient subsidy annually to more than meet the interest charges. This money is to be restored in 20 years and with reasonably competent management the ships should more than pay for themselves before that time elapses.

Doubtless an observing American like Governor Herrick must have had many serious reflections while crossing the ocean on these ships. Sitting high and dry on the hurricane deck one is utterly unmindful of the sea and really is not conscious of wild weather except as he observes other vessels struggling against it. These ships maintain an average speed of well over 24 knots in any kind of weather, and watching their magnificent performance there must come to an American a sense of humiliation that his country is disbarred from any like achievement over the forces of nature.

SUEZ CANAL TRAFFIC.

The preponderance of the United Kingdom in the world's mercantile marine is brought out in striking fashion in the returns of the Suez Canal traffic for 1907. The numbers of ships belonging to the United Kingdom and foreign countries, respectively, which passed through the canal in the last three years were as follows:

	United Kingdom.	Other Countries.	Total
1905.....	2,484	1,632	4,116
1906.....	2,333	1,624	3,975
1907.....	2,651	1,616	4,267

The total net tonnage for the past year shows an increase of 1,282,930 as compared with that of 1906, and of 1,594,329 over that of 1905. British tonnage increased by 1,195,937—from 8,299,931 to 9,495,868. German tonnage, which is next in importance, rose from a total of 2,113,484 in 1905 to 2,155,552 in 1906, and to 2,253,651 in 1907. The annexed table gives last year's traffic details for the vessels of the five leading users:

	Vessels.	Per cent of total.	Net tonnage.	Per cent of total.
United Kingdom	2,651	62.1	9,495,868	64.5
Germany	580	13.6	2,253,651	15.3
France	239	5.6	806,786	5.5
Holland	223	5.2	632,089	4.3
Austria-Hungary	129	3.0	439,997	3.0

These figures apply to ships of every description—merchant vessels, mail steamers, men-of-war, transports, etc. Taking cargo ships alone the United Kingdom comes out still better. Of the total of 3,254 of this class 2,441 were British, a figure which represents fully 75 per cent, of the number and nearly 78 per cent, of the tonnage. German vessels numbered 311, or 9.5 per cent; and France, Holland, Russia, Austro-Hungary, Denmark, Norway, and Turkey combined furnished 13.5 per cent of the vessels engaged in the carrying trade to the East through the canal. In mail steamers alone Germany has the lead. Of last year's total of 920, Germany owned 262, with a net tonnage of 1,127,930, against 159, with a net tonnage of 731,737, flying the British flag. The American flag is no where in evidence.

Notwithstanding the reduction in transit dues which took effect on Jan. 1, 1906, the revenue continues to grow. Last year's increase of £320,000 is attributed not to any abnormal or fortuitous causes, but to the general activity of trade which prevailed. The gross receipts, on a total net tonnage of 14,728,434, amounted to £4,640,000. In the 10 years, 1891-1900, the average of the net tonnage was 8,588,947, and of the receipts £3,200,000. The following are the main details of the passenger traffic for the last two years:

	1906.	1907.
Military	221,288	84,033
Civilians	103,117	105,092
Pilgrims, emigrants and convicts	35,211	54,455
	359,616	243,580

The repatriation of large numbers of Russian troops from Manchuria on the conclusion of the war with Japan accounts mainly for the abnormal figures of 1906.

STEAMSHIP PASSENGER TRADE.

The excursion season on the great lakes which is now drawing to a close has been by common report the most profitable that steamship lines have ever experienced. In point of fact, the whole passenger trade has enjoyed an unusually prosperous year. The depression which has effected business in general appears to have stimulated the passenger steamship lines. This condition is not confined to the lakes, but has been the common experience as well of the trans-Atlantic lines. Apparently many men who have not hitherto had time to take from their business concluded that they would lose nothing by enjoying themselves and taking a few months off during the summer. "'Tis an ill wind that blows no one good."

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LAKE FREIGHT SITUATION.

Ore shipments up to Sept. 1 were 11,984,936 tons as against 24,341,552 tons for the corresponding period last year, a decrease of 12,356,616 tons. During Aug. 4, 749,655 tons were shipped as against 6,806,811 tons for August, 1907, a decrease of 2,057,156 tons. All things considered, however, the August movement is quite respectable and is on the whole a little surprising, as ore did not at any time move freely. It is quite clear that no difficulty will be experienced in bringing down 25,000,000 tons this year should it prove desirable to bring down that amount. A movement of 25,000,000 tons seems low in comparison with the great movement of 42,000,000 tons last year, but nevertheless, with the exception of the year 1902, it was not until 1905 that over 25,000,000 tons were ever moved on the lakes in a single year. Business expands so rapidly on the lakes that one year's movement is no gage for the next, and it is natural for lake interests accustomed to large units, to invariably regard the record-breaking movement of one year as the minimum for all succeeding years. The physical capacity of lake equipment is enormous and it is amazing to consider that it has practically been the development of the past three years.

Lower lake ports are at present congested with vessels unloading owing to the double holiday, but it is anticipated that this work will have been fairly cleaned up before the end of the present week. Vessels now unloading that are going to take coal, however, will probably have to wait until next week to get cargoes. There is more tonnage offering than shippers can care for, and consequently the trade is without firmness.

The condition existing in the coal trade is especially undesirable. The coal docks at the head of the lakes are crowded, consumers apparently hesitating to place orders. The coal men are doing what they can to urge consumers in the interior to buy in order to relieve the docks of their burden and to facilitate the further delivery of coal which must reach the head of the lakes before navigation closes, otherwise a shortage will exist throughout the winter.

Grain is beginning to reach the elevators from the fields and is diverting a few vessels to that trade, but the grain trade is in bulk an inconsiderable trade and does not effect the general situation long.

Wages will generally advance aboard ship on Oct. 1. The captains of the Pittsburg Steamship Co. have already been notified to pay the increase and retain, if possible, in their employ the men who have served them during the summer so that they may have the benefit of the increased rate. The increase amounts to $15 a month in the case of wheelsmen, watchmen, firemen, oilers and watertenders, and $10 a month in the case of ordinary seamen.

Following are the ore shipments by ports:

Port—	Aug., 1906.	Aug., 1907.	Aug., 1908.
Escanaba	871,106	918,286	597,220
Marquette	403,328	574,659	279,610
Ashland	571,698	607,653	444,246
Superior	906,960	1,334,790	611,321
Duluth	1,601,941	2,051,280	1,764,053
Two Harbors	1,310,779	1,320,143	1,053,205
	5,665,815	6,806,811	4,749,655

Port—	To Sept. 1, 1906.	To Sept. 1, 1907.	To Sept. 1, 1908.
Escanaba	3,436,611	3,731,165	1,351,513
Marquette	1,708,937	1,924,464	725,399
Ashland	2,251,057	2,314,760	1,037,185
Superior	3,578,496	4,416,454	1,723,208
Duluth	6,584,272	7,202,645	4,583,987
Two Harbors	5,161,722	4,752,064	2,663,644
	22,721,095	24,341,552	11,984,936

PIG IRON SITUATION.

The iron market has been very quiet during the past week, due to some extent to a feeling of uncertainty as to whether there may not be price changes about Oct. 1. Extraordinary efforts are being made by manufacturers to obtain specifications on old contracts, and in some centers there is a feeling that an advance in certain finished products would be justified, but that the situation is one calling for very wise consideration. The demand for wire products continues stronger. Agricultural interests continue to be an important factor in maintaining steady demand in wire and steel bars. Contracts for structural material are not many in number, but there is a fair run of small orders. Railroad buying is not showing much increase, although orders for 5,100 cars have been placed, including special stock cars. Pig iron production for August amounted to 1,366,019 tons, an increase of 137,415 tons over July. There is fair activity in pig iron in the east, with firm prices, but in other sections of the country the market is dull. The coke situation is unchanged.

AUGUST LAKE LEVELS.

The United States Lake Survey reports the stages of the great lakes for the month of August, as follows:

Lakes—	Feet above tide water New York.
Superior	602.98
Michigan-Huron	581.70
Erie	573.13
Ontario	247.95

Since last month, Lake Superior has risen 1 inch, Lakes Michigan and Huron have fallen 1 inch, Lake Erie has fallen 2½ inches and Lake Ontario has fallen 4¾ inches.

During September, Lake Superior should rise 1½ inches, while Lakes Michigan and Huron should fall 1¾ inches, Lake Erie 3¼ inches and Lake Ontario 4½ inches.

Lake Superior shows a normal height, at the average August stage of the past 10 years, and practically the same as in August, 1906. It is 13 inches higher than in 1892 and half an inch higher than last year; but it is lower by 1½ inches than in 1905, and lower by 3¼ inches than in 1903.

Lakes Michigan and Huron show the highest August stage since 1888, when the water was 6½ inches higher. They are 7½ inches above the average August stage of the past 10 years, 3 inches highes than last year, and 21¾ inches higher than in 1896; but in 1883 the water was 19¾ inches higher.

Lake Erie is slightly higher than in August last year, and is at the highest August stage since 1890, when it was ½-inch higher. It is 6½ inches above the mean August stage of the past 10 years, and 21 inches higher than in 1895. It is, however, 11¾ inches lower than in August, 1876 and 1883.

Lake Ontario shows the highest August stage in 38 years, or since 1870, when it was ¼-inch higher. In 1861 it was higher by 1½ inches, and in 1862 higher by 3¾ inches. It is 21 inches higher than the average August stage of the past 10 years, 43¼ inches higher than in 1895, 4¼ inches higher than in 1886, and 3¾ inches higher than in 1904.

NEW BOAT FOR WHITE STAR LINE.

The White Star Line of Detroit has given contract to the Toledo Ship Building Co. for a new passenger steamer to come out next season. The new boat will be 185 ft. long and is intended for service between Detroit and Port Huron. The joiner work for the boat will be built at the White Star shops in Detroit.

Three weeks will be needed to make repairs on the steamer Neepawah at the Ecorse yard of the Great Lakes Engineering Works. Fifty-six bottom plates must be removed and a number of frames.

President Wm. Livingstone, of the Lake Carriers' Association, has returned from a trip to Duluth on the new steamer Wm. Livingstone with his family.

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PHILADELPHIA HARBOR'S NEEDS.

The report of Joseph F. Hasskarl, assistant director of docks, covering his line of investigations abroad in the interest of Philadelphia's harbor, is given below and is regarded as a clear, concise and comprehensive exposition of conditions as they exist in Europe, together with suggestions that might be followed in the general scheme of improving that port's water front. Mr. Hasskarl refrains from urging radical innovations, and contends that while Europe is far ahead of us in harbor facilities the topographical conditions which confronted foreign municipalities were such as to make it imperative on them to follow a system that could not be adopted here.

The solidity of structures and the spacious warehouses inspected were favorably commented upon by the assistant director. On the advisability of constructing large basins in the lower end of the harbor, Mr. Hasskarl says they are not needed at Philadelphia and would not have been built abroad were it not that tidal conditions and narrowness of streams made it compulsory for various European ports to construct such docks. He urges the inauguration of traveling cranes as the best and most economical method for loading and discharging cargoes, and says they are universally used in all ports in Europe. He considers the employment of such cranes very desirable since they render efficient service in the expeditious handling of cargoes.

Mr. Hasskarl was also impressed in his journey by discovering that all ports visited were directly under the control of the municipalities. The docks were operated under rules and regulations promulgated by managers or directors chosen for that special purpose. He was also agreeably surprised to see the large and expensive improvements everywhere in evidence, and the zealous care and enterprising spirit of officials in charge of the commerce. Another important point that appealed to the assistant director was the absence of discrimination by railroads against any port or any section of a port. This was due to control or ownership by the government. He lamented that Philadelphia had been made to suffer through neglect on the part of the federal, state and city governments. No deterioration was seen in any harbor visited, but, on the contrary, there was an evident desire to keep the terminals in the best possible condition.

The geographical and topographical situation of Philadelphia, Mr. Hasskarl says, is such that it should become the greatest freight shipping and distributing point in America. With adequate improvements he predicts that this port will regain the prestige it has lost as a world seaport. He recommends the purchase of all marsh lands fronting on the Delaware river, the construction of retaining embankments or bulkheads and the filling in of marsh lands with material dredged from the Delaware and Schuylkill rivers. By taking over these lands now, he says, improvements can be made that will make them more valuable in a short time. He also urges the construction of piers on this improved marsh land and is confident the revenues derived from the investment will be satisfactory to the city and will afford an opportunity for Philadelphia gradually to regain control of its water front.

Mr. Hasskarl offers suggestions for minimizing the dangers of the Horseshoe during ice conditions. He says that by building a bulkhead and dredging the channel between Point House wharf and to the point where Broad street crosses the back channel at the entrance to the navy yard, to a width of 1,500 ft. with other modifications, there would be no further difficulty or danger at the Horseshoe from ice gorges. He urges the extension of Delaware avenue along the river front and back channel as far as Broad street, and suggests that in planning extensions of Delaware avenue consideration must be given to the fact that longer piers will soon be needed, and adds that the avenue should be laid out so as to permit of the construction of piers 800 ft. or more in length. Recommendations are also made covering the back channel, the building of scows or wharves for ashes and the necessity of keeping the Schuylkill in good, navigable condition.

Mr. Hasskarl urges that the government be importuned to build a dike at the upper side of the mouth of the Schuylkill to maintain the necessary depth there. He also recommends that the city construct bulkheads on both sides of the Schuylkill from the dam to its mouth. He urges the elimination of all sharp bends in the river by having a straight channel dredged from Gibson's Point to Yankee Point, or else considerably widen the channel in the bends at Yankee Point, Point Breeze and at Gibson's Point.

The assistant director recommends that laws be enacted by the legislature and councils empowering the department of docks to control the piers and bulkheads of the harbor, which would prevent discrimination of any kind by railroads or wharf and vessel owners. He suggests that the state railroad commission be requested to fix railrad rates for freights so that a uniform scale will be charged to and from wharves over the most direct route within the city limits.

He also urges the immediate construction of two modern double-deck piers, conveniently situated and equipped with eight traveling cranes. The piers, he says, should have on the second floor warerooms so constructed that the temperature could be regulated with a view to taking care of semitropical fruits and other products. He urges that funds be provided at an early date to make necessary repairs to city piers and bulkheads, some of which, he says, are in a very dilapidated and dangerous condition. He also urges the immediate dredging of docks where sewers empty and the removal of shoals in front of docks.

Mr. Hasskarl tells the mayor that no one act of his administration will give greater satisfaction to the citizens of Philadelphia or redound more to his credit than the improvement of the port. These improvements, in point of importance, in the opinion of the assistant director, rank second to none, save those measures looking to the health and safety of the people. Mr. Hasskarl complains of the meager sums heretofore appropriated by councils for the dock department, which, he says, are not enough to perform necessary maintenance work.

Following is the text of the report of Assistant Director Hasskarl to Mayor Reyburn:

Hon. John E. Reyburn—Sir: I have the honor to report that in compliance with your request I accompanied the director, John C. Grady, on an official tour of inspection of the principal ports of Europe with a view of ascertaining the methods of loading and discharging vessels employed abroad, and in order to study foreign pier construction, etc. We visited the principal ports of Italy. Austria, Germany, Holland, Belgium, France and Great Britain, and found that, owing to topographical conditions, all the piers of those countries are, with but few exceptions, solid earth and stone, or concrete structures, with warehouses on the same for the storing of freight. Some of the harbors, such as Genoa, Naples, Palermo, Trieste and Havre, are protected by large and costly breakwaters.

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Owing to the narrowness of the streams and tidal conditions at several of the ports visited, the range of the tide being in some instances as great as 30 ft., piers projecting into the river, such as we have in America on our rivers, could not be built, and it was, therefore, necessary to construct docks in which the vessels lie while loading and discharging cargoes. These docks have double-lock gates, thus enabling them to maintain the water in the docks at all times at a certain level.

The loading and discharging of cargoes from vessels in all the ports visited is accomplished by the use of traveling cranes, with a capacity of from one to three tons, and operated either by steam, hydraulic pressure or electricity. The electric cranes are considered the most satisfactory and economical to operate. The use of these traveling cranes makes it possible to load or discharge vessels more rapidly. Where speed is desired, I found the custom to be that the ships' derricks were used to take the freight out of the holds of the vessels, and depisit same on the decks of the vessels; from there the traveling cranes would place it on the cars, wagons or in the warehouses. This method results in the saving of time, since that each derrick has to traverse a lesser distance than would be the case if only one derrick is used. In other cases, the traveling cranes take the cargo directly out of the holds of the vessels and deposit it on the piers, etc., and vice versa when the operation is that of loading vessels.

The cranes are usually constructed to operate on tracks from 12 to 15 ft. apart, and in most instances are built to permit freight cars to pass underneath. I consider the employment of such traveling cranes very desirable, since they render efficient service in the expeditious handling of cargoes.

I also found that the harbors of the countries visited are directly under the control of the municipalities. The docks, etc., are all operated under rules and regulations promulgated by a board of managers or directors, either elected or appointed for the management and improvement of the harbors.

I was agreeably surprised to see the large and expensive improvements made, and with what zealous care the harbor and shipping interests are protected, and the aggressive, enterprising spirit shown to build up and improve the commerce of the different ports visited.

The authorities and commercial interests of the European countries realize that present and future prosperity depends largely on good shipping facilities, both inland and by sea, at minimum rates, and in order to obtain these results and foster their industries, they expend vast sums of money when necessary.

As the railroads are all either owned by the government, or under its control, discrimination against a port or any section of a port is totally unknown in Europe. Philadelphia harbor has for many years suffered through neglect on the part of the federal, state and city governments to provide the necessary means for the deepening and maintenance of the Delaware and Schuylkill river channels and of the harbor, and also through discrimination against the port by certain railroads.

Nowhere in my entire trip abroad did I find a single port where wharf properties and harbor facilities were allowed to deteriorate, as has, unfortunately, been the case in Philadelphia, which is only the natural result of neglect and discrimination.

DELAWARE RIVER.

Of the total amount of Delaware river water front now in use between Allegheny avenue and Point House wharf, a distance of 41,360 ft., the city of Philadelphia owns 3,598 ft., or about 8 per cent; the Pennsylvania Railroad, 9,851 ft., or 24 per cent; the Philadelphia & Reading Railway, 9,200 ft., or 22 per cent; and the Baltimore & Ohio Railroad, 1,923 ft., or 4.6 per cent.

Of the above amount owned by the city of Philadelphia, a considerable portion is in detached sections, such as the foot of streets, ranging from 10 to 100 ft. in width.

These figures emphasize the fact that the city does not own sufficient water front to be in the independent and strong position it should, in order to control its port facilities.

The geographical and topographical situation of Philadelphia is such that it should become the greatest freight shipping and distributing point in America. With a channel of adequate depth and width, and necessary harbor improvements and wharf facilities, Philadelphia, I am sure, will soon regain the prestige she has lost as a world sea port and the commerce that has been allowed to drift from this to other cities.

In order to accomplish these results, I respectfully make the following recommendations:

First. That early action be taken so as to ultimately give the city enough river front property and wharves to accommodate new lines seeking terminals at this port, and also to prepare for the increased commerce that is sure to follow such improvement.

Second. That the city of Philadelphia shall purchase at an early date all the marsh lands fronting on the Delaware river within its boundaries. Constructing retaining embankments or bulkheads on the river front and filling in the marsh lands with material dredged from the Delaware and Schuylkill rivers while the improvements of those streams are in progress would make the land purchased much more valuable than at present. The construction of piers on this improved marsh land would enable the city to derive good returns on its investments and gradually give the city control of its water front, as is being done by New York and other progressive cities.

Third. That the city purchase at an early date the marsh lands between Point House wharf and League Island, and build a bulkhead on the bulkhead line from Point House wharf to the point where Broad street crosses the back channel at the entrance to League Island. For the present, it is considered sufficient that the bulkhead be built from Point House wharf to the entrance of the back channel at the upper end of League Island, and that the area thus inclosed should be filled in to the height of 12 ft. above mean low water.

The material for filling in behind the bulkhead could readily be obtained by widening the main ship channel in the Horseshoe. As is well known, the Horseshoe is the most dangerous and difficult place in the Delaware river for vessels to navigate in winter time, owing to the ice gorges forming there, it being almost impossible to keep that place navigable under present conditions. It is thought that by constructing the above-mentioned bulkhead and by dredging the channel at that point to a width of 1,500 ft., the additional width of 900 ft. of channel being toward the Philadelphia side of the river, and then gradually lessening the width, so that opposite Point House wharf and opposite League Island there will be a width of 600 ft., which is the ordinary width of the channel as now projected, there would be no further difficulty or danger in that locality from ice gorges.

Fourth. That Delaware avenue be extended along the Delaware river

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front and back channel as far as Broad street. For the present it would be sufficient and greatly aid commerce if Delaware avenue was extended to Point House wharf. The distance between the pierhead and the bulkhead lines for the greater portion of the Delaware river front is limited to less than 600 ft., since the eastern side of Delaware avenue follows the bulkhead line; thus the length of the piers is also limited to a length of about 600 ft. In planning future extensions of Delaware avenue, consideration should be given to the fact that longer piers will soon be needed, and the avenue should be laid out so as to permit the construction of piers 800 ft. or more in length.

Fifth. That the back channel between League Island and Philadelphia, east of Broad street, be eventually widened and deepened, so as to accommodate large vessels. This channel should be bulkheaded on both sides, so as to allow vessels to lie alongside of the bulkhead, and thus considerably extend the water front for the accommodation of vessels. (The United States government would pay for all work done on the League Island side of the back channel.)

Sixth. That the city provide scows or wharves on which tugboats and other vessels entering and engaged in this port could discharge ashes. These scows or wharves could be under the control of this department, and a record be kept of all vessels depositing ashes there. This would prevent the frequent violations of the law by crews of vessels depositing ashes in the Schuylkill and Delaware rivers. If the depositing places for ashes are properly managed, their records would show any violation of the law, since the movements of all tugboats and other vessels would be known. As it is now, fully 95 per cent of the ashes collected on steam vessels in this port are deposited in the river, which is contrary to law, and causes shoaling in the channel.

SCHUYLKILL RIVER.

As about 25 per cent of the total commerce of this port is on the Schuylkill river, it is therefore of great importance to keep the river in good navigable condition.

Seventh. That the government be urged to build at an early date a dike at the upper side of the mouth of the Schuylkill river, in order to maintain the necessary depth at that locality.

That the city should, at an early date, require bulkheads to be built on both sides of the Schuylkill river from the dam to the mouth. Such bulkheads would tend to maintain the channel, and would prevent erosion of the river banks and the washing in of material from the shores. By filling in the land behind the bulkheads with material dredged from the river channels, which could be done at comparatively small cost, the river front property would become useful and much more valuable and would soon repay the owners for the additional expenditure.

That the sharp bends in the river, which now make navigation for large vessels difficult and dangerous, be eliminated by having a straight channel dredged from Gibson's Point to Yankee Point, or else considerably widen the channel in the bends at Yankee Point, Point Breeze and at Gibson's Point, thus enabling vessels to safely make those turns.

Eighth. That laws be enacted by legislature and councils empowering the department of wharves, docks and ferries to regulate and control the piers and bulkheads of he harbor, in order that the greatest amount of business can and will be transacted at fair rates and also to prevent discrimination of any kind by railroads, wharf and vessel owners, etc.

Ninth. That the state railroad commission be requested to fix railroad rates for freights, so that a uniform rate, according to distance, will be charged to and from wharves, over the most direct route within the city limits. The establishment of such rates and the enforcement of the same would prevent the discrimination now complained of by many shippers, merchants and manufacturers in this city.

Tenth. That in renting municipal piers the reputation of the tenant and the nature of the business, etc., be considered fully as much as the rate of rental to be paid, as, in my opinion, it is not always desirable to rent a pier to the highest bidder, since such a bidder might, to prevent competition, bid highest for a pier, and then keep it idle or use it for purposes not intended by the city, thus preventing other lines or vessels from coming to this port.

Eleventh. In order to inaugurate the policy outlined in the foregoing report, I respectfully recommend that two conveniently located, modern, double-deck piers, with eight electric traveling cranes on each (four on each side), with a capacity of three tons each, be constructed at once. These piers should have on the second floor warerooms so constructed that the temperature in the same can be regulated, in order to take care of semi-tropical fruits and other products requiring uniform or a certain degree of temperature for their preservation while in storage.

Twelfth. That funds be provided at an early date to make necessary repairs to city piers and bulkheads, some of which are in a very dilapidated and dangerous condition. Also funds to be applied to necessary dredging in docks where sewers empty, etc., and for the removal of shoals in front of docks to enable deep draught vessels to use the same.

In conclusion, I wish to say that the greatly neglected condition of the port of Philadelphia is well known both at home and abroad. No one act of your administration will give greater satisfaction to the people of the city or redound more to your credit than will be the improvement of the port of Philadelphia.

In importance that much-needed improvement ranks second to none now in progress, save perhaps that of furnishing good and pure water to the citizens of Philadelphia, and protecting them by the elimination of grade crossings, etc., the greatest care of a municipality being the health and safety of its people, the second, the exploitation and development of its commercial possibilities.

The sums of money heretofore appropriated by councils, to be expended by this department, have been totally inadequate to make any appreciable improvement, or even perform necessary maintenance work. It is the hope and wish of every citizen of Philadelphia that you speedily inaugurate a system whereby sufficient appropriations will be made to carry out some large and comprehensive project for the improvement of the harbor and piers worthy of a city of Philadelphia's importance.

J. F. HASSKARL,
Assistant Director.

Plans to save the stranded steamer Corona, which went ashore March 1, 1907, on the breakwater at Eureka, Cal., have so far advanced that a wharf 600 ft. in length has been built out from the shore to the wreck and on this steam and oil pipes are to be laid to furnish means for floating the wreck. The hull must be freed of a great quantity of sand after which she will be patched up and pumped out. The work is directed by C. P. Doe, of the North Pacific Steamship Co., which company has purchased the wreck from the Pacific Coast Steamship Co. No difficulty is anticipated and with good weather the hull will soon be afloat.

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MOTOR BOAT REGULATIONS.

Capt. James Stone, United States supervising inspector of steamboats, has issued the following statement regarding the operation of motor boats on the great lakes:

"The recent collision of the steamer Greyhound and the small motor vessel called the West Wind in a straight channel entering the Toledo harbor, should serve as an object lesson to all who aspire to take charge and operate these small motor vessels.

"In the case referred to on the evening of July 30, 1908, the sidewheel steamer Greyhound was passing up the dredged channel, which is very wide and marked by range lights and buoys and in no way intricate and difficult to navigate. The steamer was in charge of Capt. Thomas Meikleham, who saw about 500 to 800 ft. ahead and well on his starboard bow a dark object exhibiting no light to indicate its character or in what direction it might be moving, if moving at all, and which within a few seconds proved to be a motor boat approaching at full speed and swinging rapidly under a port helm.

"The captain of the steamer grasped the situation, almost simultaneously, sounded an alarm signal, stopped and reversed the engines. The yacht continued swinging to starboard, struck the steamer at full speed end on just forward of the starboard wheel. Just at this juncture the steamer's engines were stopped from backing, the yacht disappeared in fragments.

"A boat was immediately lowered from the steamer and succeeded in picking up five survivors. The operator of the yacht, who was also the owner, was drowned. This yacht was being navigated in violation of every rule or law governing such vessels. No licensed person in charge, no lights shown, no whistle signal sounded, no life preservers aboard and was carrying passengers for hire, which is strictly forbidden without a licensed person in charge.

"After a trip through the ninth district and talking with the different local inspectors and customs officials, I believe the conditions are improving along these lines, but possibly not with the ratio of the enormous increase in the number of motor vessels that are under the law operated by inexperienced men although licensed without any experience being required or even an examination of the candidate being permitted.

"I wish all operators of motor vessels, whether licensed or not, would call on the local inspectors for a pamphlet called 'Pilot Rules for the Great Lakes' and read them over until they are familiar with the rules of navigating these waters."

KAISER WILHELM'S RECORD.

The North German Lloyd liner Kaiser Wilhelm II reached Plymouth last Monday morning after a voyage which eclipses all previous performances of German liners, as she steamed from Sandy Hook to the Eddystone lighthouse in five days nine hours 55 minutes over the southern course of 3,008 sea miles. The average speeed was 23.71 knots, which has been excelled only by the Lusitania and the Mauretania among liners. Her daily runs were 533, 553, 556, 556 and 551 sea miles, with 331 miles to the Eddystone. Her mails, landed at Plymouth, reached London in record time from New York. The Kaiser Wilhelm II on the present trip has beaten by quite an hour the achievement of the Kronprinzessin Cecilie, which only a fortnight ago established a record by bringing London within 5 days 17 hours 43 minutes of New York.

STEAM TURBINE FOR GERMAN TORPEDO BOATS.

The 12 new torpedo boats under construction for the German navy are boats of about 610 tons, and are all to be driven by steam turbines. It is planned to try four different types of turbines. The three boats which the Vulcan yards near Stettin are constructing are to be equipped with turbines of the Allgemeine Elektricitats-Gesellschaft (Curtis type); the four boats which the Schichau yards of Elbing and Danzig have undertaken to build will receive turbines of Melms and Pfenninger; similar turbines are also put on board the small cruiser which the Schichau works have built to replace the Greif. Of the five torpedo boats under construction at Germania yards at Kiel, four are equipped with Parsons turbines, and one with Zoelly turbines.

It is announced by Grant, Smith & Locker, contractors for the second section of the new Livingstone channel at the Limekiln Crossing in the lower Detroit river, that the cofferdam inclosing the improvement is about complete and that the work of pumping water from the section of the channel will begin about Oct. 1.

Mulholland hatch fasteners have been put on the steamer Cort, undergoing repairs at the yard of the Toledo Ship Building Co.

COMMERCE ON LAKE SUPERIOR.

The August movement of freight through the canals at Sault Ste. Marie was 7,181,432 tons. The movement to Sept. 1 of the present year is 20,271,904 tons as against 33,526,388 tons for the corresponding period last year, a decrease of 13,254,434 tons. Following is a summary of the movement of the principal items to Sept. 1, with corresponding data for the two preceding years:

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

Items.	To Sept. 1, 1908.	To Sept. 1, 1907.	To Sept. 1, 1906.
Coal, anthracite, net tons	901,335	836,924	513,783
Coal, bituminous, net tons	4,995,541	6,328,853	4,412,419
Iron ore, net tons	11,767,874	22,485,323	21,247,365
Wheat, bu.	31,365,572	48,430,731	30,660,574
Flour, bbl.	2,165,234	3,165,345	3,116,994

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO SEPT. 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.

Items.	To Sept. 1, 1908.	To Sept. 1, 1907.	To Sept. 1, 1906.
Copper, net tons	51,839	42,497	62,033
Grain, other than wheat, bushels	12,918,066	23,433,385	28,262,003
Building stone, net tons	1,019	320	1,472
Flour, bbl.	2,164,814	3,165,354	3,107,910
Iron ore, net tons	11,767,874	22,485,323	21,247,365
Iron, pig, net tons	12,700	9,271	17,463
Lumber, M. ft. B. M.	261,839	417,715	552,891
Wheat, bu.	31,365,572	48,430,731	30,660,574
Unclassified freight, net tons	50,810	66,872	103,014
Passengers, number	20,322	25,043	25,068

WEST BOUND.

Coal, anthracite, net tons	901,335	836,924	513,783
Coal, bituminous, net tons	4,995,541	6,328,953	4,412,419
Flour, bbl.	685	.....	9,084
Grain, bu.	700	.....	6,749
Manufactured iron, net tons	143,575	178,637	204,116
Salt, bbl.	339,056	276,267	276,551
Unclassified freight, net tons	402,336	537,055	575,972
Passengers, number	21,729	25,612	25,666

SUMMARY OF TOTAL FREIGHT MOVEMENT.

	To Sept. 1, 1908.	To Sept. 1, 1907.	To Sept. 1, 1906.
East bound freight of all kinds, net tons	13,778,509	25,603,655	24,204,547
West bound freight of all kinds, net tons	6,493,395	7,922,733	5,749,731
Total freight, net tons	20,271,904	33,526,388	29,954,278

The total number of vessel passages to Sept. 1, 1908, was 8,333, and the net registered tonnage, 15,200,377.

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LACKAWANNA STEEL SHEET PILING.

The Lackawanna Steel Co., Buffalo, has recently placed upon the market a new form of steel sheet piling. Each pile is a single piece complete in itself as it comes from the rolls, and requires no fabrication. The piling is a special rolled one-section bar, consisting of a web portion with flanges

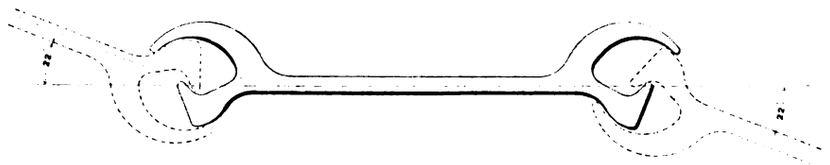

FIG. 1—SECTION OF LACKAWANNA STEEL SHEET PILING.

of like form at each edge and adapted to engage with the similar flange of an adjacent section. The piling will interlock with the one previously driven.

Fig. 1 represents clearly the form of the piling as rolled. It will be noted that in this piling the flanges on the same side of the webs are similar in design. The shorter flanges are hook shaped and engage with the corresponding hooked flange of the adjacent section. The longer flanges are shaped as shown to form a guard around the hook of the adjacent section. When the piling is driven, the hooked flanges prevent longitudinal displacement while the guard flanges prevent lateral displacement, and assist to prevent longitudinal displacement of the sections. The joint has three points of bearing which produce a close, positive and double interlock, offering in a built up wall a rigid resistance to the strain to which such a wall is subjected, particularly the longitudinal strain, and the side or buckling strains. At the same time, this interlock, with a bearing on both sides of the web, is such as to hold the piling in line while being driven, and to form a straight wall.

The illustration shows the adopted sections. Before placing them on the market, an experimental cofferdam was driven with 32-ft. lengths of 12¾-inch sheet piling. The material enclosed was subsequently excavated in order to ascertain the condition of the piling after driving, and to determine its efficiency as a protection against leakage. The result of this experiment proved that the interlock was perfect, and that the joints were practically water tight. A series of tests was also conducted to determine the strength of the interlock, and the average of these tests shows that with two 12¾-inch sections interlocked the joint has in tension a value of 9,700 pounds per linear inch of bar. It is, therefore, a desirable pile for work in which high tension stresses exist. A feature of this bar is the ability to turn various angles and still maintain a perfect interlock, the shape of the interlocking flanges and hooks permitting a change in a direction with a line of piling in case of the encountering of boulders, etc.

A piling of this character and form

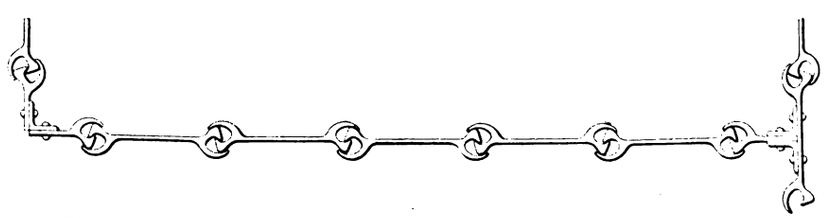

FIG. 2—SHOWING METHOD OF MAKING CORNER JOINTS AND WALL JOINTS WITH LACKAWANNA STEEL SHEET PILING.

is especially adapted to the construction of retaining walls, foundations, cofferdams, submarine work, mine shafts, etc., where quicksand and water are encountered. An important feature of the Lackawanna piling is that when driven in ordinary soil, such as clay and quicksand, enough of the soil works into the joints to make them practically water-tight. If driven in clear water, the usual methods of packing, if necessary, may be employed to produce a water-tight joint.

On account of its simple form, it has many advantages in handling and driving. The friction area in the interlock, being three narrow surfaces, is at a minimum, so the piling can be easily driven and withdrawn a number of times, and when it has outlived its usefulness, the discarded material can be sold for scrap.

The table below shows the standard weights and widths of sections rolled:

Thickness of web, Inch.	Weight per sq. ft. of wall, Pounds.	Distance C. to C. of joints, Inches.	Weight lin. ft., Pounds.	Width of joint over all, Inches.
½	40.00	12¾	42.500	3 45/64
⅜	35.00	12¾	37.187	3 45/64
¼	19.70	7	11.500	1 53/64

In driving, an ordinary pile driver is used, the head of the piling being fitted with an iron cap having a wooden cushion interposed between the iron cap and the hammer of the pile driver. In driving, satisfactory results have been obtained in keeping the vertical alignment of the bar. This is an important point, especially where a long wall is driven and long lengths are used. In the closing of rectangular pockets, the vertical alignment must be true in order that the closing pile will drive freely for its full length and not strain the interlock.

Fabricated corners are formed by fitting the edges of two half sections at the desired angle by means of structural steel angles. Junction members for cross walls are made up of a full section, a half section and two angles riveted together. Both styles of fabricated corners are shown in Fig. 2.

The 12¾-inch bar has been adopted for the construction of the cofferdam for the new government ship lock in Black Rock Harbor, Niagara river, at Buffalo, N. Y. This lock when completed will be one of the largest ship canal locks in the world. Before selecting the piling to be used in this harbor improvement, a series of tests was made, subject to United States government inspection, in which several makes of piling were driven, and the results obtained from the Lackawanna bar were so satisfactory that the contractors adopted it for this extensive construction.

This is the largest single order of steel sheet piling ever placed for government work, requiring 7,000 tons for the complete cofferdam. This cofferdam is 947 ft. long, 245 ft. wide outside dimensions at one end and 250 ft. at the other end, and requires lengths of 44 ft. to 50 ft. of piling. The wall of the cofferdam is made of two lines of piling 30 ft. apart, with division walls at 30-ft. intervals, forming 30-ft. pockets. Later these pockets will be filled with clay to form the solid wall of the cofferdam.

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THE EXTENSION OF KEYHAM DOCKYARD.

The extension of the Keyham dockyard at Devonport is one of the more important British engineering achievements of recent years, and some of its leading features can be understood from a paper on the subject presented recently before the Institution of Civil Engineers by Sir Whately Eliot. The dockyard extension occupies an area of 118 acres, of which 77 acres were mud foreshore. The works consist of three graving-docks, two of them opening into a tidal basin of 10 acres at the south end, and all of them opening into a closed basin of 35½ acres at the north end, also of a lock giving access to the closed basin. A retaining wall has been built along the east boundary of the new works which adjoin higher ground. The whole area of the works was enclosed on the water side by a coffer-dam 5,576 ft. in length, which entirely excluded the tidal water. Portions of the works situated landward of high-water line were commenced while the coffer-dam was being constructed.

The tidal basin walls are everywhere founded on rock, the depth varying from 57 to 80 ft. below the coping, and the bottom of the basin being 55 ft. below coping. The walls are constructed of concrete, the upper part faced with granite. The face of the wall is formed to a batter of 1 in 8 in the upper part, in the lower part to a batter of 1 in 4, the two parts being joined by a curve of 135 ft. radius. On the west side is the entrance, 120 ft. wide. Timber fendering is fixed to the upper part of the walls.

The closed basin is 35½ acres in extent, including the pier, and the formation of the walls is practically the same as for the tidal basin. The height of the walls from foundation to coping varied from 57½ to 108 ft.; the bottom of the basin is 55½ ft. below coping, and 32½ ft. below low water of spring tides. From the center of the north wall a pier extends into the basin; this pier is 500 ft. long and 75 ft. wide. On the west side of the basin an entrance is constructed 95 ft. wide, with a depth on the sill of 32 ft. at low water of spring tides. The entrance is closed by a sliding caisson, and also by a floating caisson.

When the mud had been removed from the site of the docks, and the rock cut out to the form and depth required, concrete was deposited, the average depth under the center part of the floor being 14 ft., and under the side parts 12½ ft. The concrete was deposited in sections, and to the full depth, to avoid horizontal joints. The floor-stones of granite were bonded into the concrete and bedded in cement mortar. After the concrete floor was completed, the side walls were commenced. Up to the level of the first broad altar, the beds of the granite face stones radiate, the concrete at the back having been first deposited and shaped to receive the face stones. In the upper part of the walls the face stones were set on a level bed, and afterwards backed with concrete. The walls of the docks and lock above the top broad altar are faced with concrete blocks having a granolithic face.

Dock 4 is 650 ft. long, Dock 5 is 745 ft., Dock 6 is 741 ft., and the lock is 730 ft. long. All the entrances are 95 ft. wide, and fitted with sliding caissons. In Docks 5 and 6 a floating caisson is fitted into a groove dividing each dock into two separate docks, if required. The width of all the docks on the floor is 70 ft., and at the coping 121 ft. The lock is constructed so that it can be used at any time as a graving dock. The depth of water at low water of springs on the sills of Docks 4 and 5 is 20½ ft., of Dock 6 and the lock, 32 ft. The floor of each of the docks is 4½ ft. below the floor of the entrance.

The outer wall forms the west and north boundary of the new works, and extends from the south end of the lock to a point near the naval barracks. The total length of the wall is 4,730 ft.; it is founded throughout on rock. For half the length the depth of mud varied between 30 and 60 ft., and for the remaining half it varied between 60 and 100 ft. In order to reach the rock through such a depth of mud a special form of concrete column was used. These columns were built in rings 2½ ft. thick, the rings being in sections, and jointed with cement mortar. Three wells were formed in each column, through which excavating grabs worked, and brought up mud from the bottom of the column. The base of each column was provided with a cutting ring of concrete 5 ft. in depth, and formed in one piece, strengthened with iron bands embedded in the concrete. The ring was made in place, and when it was ready to be sunk, built-up rings were added, and the mud was lifted from the wells by grabs, weights being placed on the top of the column to force it through the mud. The columns were sunk until the rock was reached, which was then leveled by hand, and the wells were filled with concrete.

When the depth of mud did not exceed 60 ft., a single row of columns was sunk, and a timbered trench was excavated at the back, in which the back part of the foundation was constructed of concrete, which was packed around and between the columns, spaced 10 ft. apart. When the depth of mud exceeded 60 ft. it was necessary to sink a double row of columns, 3 ft. apart transversely. The spaces between the columns were then cleared of mud and filled with concrete. The sinking of the columns was carried out very successfully, and a solid foundation was obtained on which to build the upper wall, which is faced with concrete up to 26½ ft. below the coping, and above that level with granite, to which is attached a fendering of timber.

For filling the docks with water, two culverts, 8 ft. high and 6 ft. wide, are provided at each end, and fitted with penstocks. For emptying the docks two main culverts, 7 ft. in diameter, are provided, one at each end, and connected by branch culverts to the interior of the docks. The water is conducted by them to the main pumps.

REINFORCED CONCRETE BOATS.

Much has been written of late regarding the success of the reinforced concrete boats which were built last year and operated on the Tiber at Rome, but until the Morchel & Lowther Engineering Co., of Kansas City, Mo., began making experiments with models of concrete boats nothing had been done in that line in America. The work has not yet advanced beyond the model stage but it is stated that the experimental data gained from these models taken with the calculations of the designs of full sized boats of 300 tons and over, show that the difference in weight between steel and concrete, as applied to boat construction, is comparatively small. Concrete offers less resistance to propulsion in water than wood or steel, and no painting is required. The cost of concrete boats is about one-half less than steel boats and the maintenance cost is nothing.

One of the best demonstrations of the power of reinforced concrete to resist shocks is the trial made by the Italian government with a steel and a concrete boat. A 1,000-ton concrete boat was rammed by a much larger steel vessel, the result being that the concrete boat suffered less damage than the steel boat. Various trials of this nature have led the Italian government to consider the armoring of their war vessels with concrete.

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ATLANTIC COAST NOTES.

Office of the MARINE REVIEW,
Room 1005, No. 90 West St.,
New York City.

The total tonnage taxes collected during the past fiscal year, the Navigation Bureau at Washington has announced, amounted to $1,076,572. American vessels paid $82,680; British, $629,664; German, $145,930, and vessels of other nationalities the remainder. The port of New York collected 38 per cent of the total tonnage tax, which is the largest in any year since 1884.

None of the graduates of the school of navigation connected with the Pennsylvania Seamen's Friend Society, Philadelphia, which reopens on Sept. 14, has failed to pass the necessary examination for master's or mate's license. No charge is made for instruction.

No less than 150 vessels, schooners, steamships and barges, passed out of the Hampton Roads one day last week, this being the greatest number of merchant vessels and also the largest tonnage to pass out in one day.

Statistics compiled for the month of August show that the four largest steamship companies during that month carried to the port of New York 7,307 first cabin, and 7,839 second cabin passengers, making a total of 15,146. The Kaiserin Auguste Victoria, which sailed from Cherbourg last Friday, brings 1,091 passengers in first, second and third cabin, and 400 steerage. The Rotterdam, the new Holland-America liner, arrived at New York this week with 445 first and 564 second cabin passengers.

The oil tank steamship Iroquois arrived at New York this week from London, having in tow the barge Navahoe. The two vessels, which carry over 7,000,000 gallons of oil, made the round trip from this port to London, stopping each way at the Hook of Holland, in 33 days. The Iroquois uses fuel oil in her boiler rooms and, like the Navahoe, is equipped with wireless apparatus.

The steamboat Lina, which ran between Lewes, Del., and Cape May until recently, sank last week at the transportation pier at the Delaware Breakwater. The Lina had been laid up for the season and the cause of the accident is not known.

The Puritan, the famous old cup defender which in 1885 defeated the English challenger Genesta, will in future be engaged in the transportation of passengers and fruit between New Bedford and the Cape Verde Islands, off the West coast of Africa. The Puritan was designed for the late J. Malcolm Forbes, of Boston, by the late Edward Burgess.

The steam yacht Verona, owned by Eugene Higgins, of New York, recently put into Cherbourg, France, considerably damaged by heavy weather in the English Channel.

The three-masted schooner Luther T. Garrettson arrived at Norfolk, Va., from New York, with her foretopmast and foresail carried away in a strong wind encountered as she turned into the Virginia capes.

The steamship Chesapeake, which recently ran ashore near the iron pier, Delaware Breakwater, and was floated under the direction of Captain Potter, of the wrecking steamer Breakwater, arrived at New York on Thursday.

Captain Burg, of the steamship City of Savannah, which arrived at New York on Sunday, reports having passed a submerged wreck with the stump of a mast projecting 10 ft. from the water. The derelict is a menace to navigation.

The United States revenue cutter Mohawk has arrived at the Delaware Breakwater and reported destroying a derelict hulk 15 miles north-east of Barnegat.

The German steamship Washington, from Hamburg, reports that on Aug. 29, latitude 48.48, longitude 48.35, she passed three large icebergs, the largest being 500 ft. long and 120 ft. wide.

The ship Edward Sewall has left the Greenwich coal piers for San Francisco with a cargo of coal for government use.

The Italian steamship Sicania, which grounded near the Delaware Breakwater while outward bound from Philadelphia for the Mediterranean, will be docked by her owners at Messina to repair damages sustained.

AROUND THE GREAT LAKES.

C. Clemente, 1722 Oregon avenue, Cleveland, inventor of Sawdolet, has installed this flooring upon the bulk freighters Philip Minch, Anna C. Minch and Henry Steinbrenner, and has orders for several other steamers.

The Kosmos steamer Anubis which was wrecked in Santa Barbara channel July 21, has been towed into San Francisco bay by the tug Goliath. It will take about two months to repair her.

The steamer Chauncey Hurlbut went ashore behind White Fish Point, Lake Superior last week. Her consort, the schooner Clint, was picked up in a water-logged condition and was beached behind White Fish Point. The Revenue Cutter Tuscarora later towed the Clint to Sault Ste. Marie and her crew were taken to Detroit on the steamer Tampa. The Hurlbut is reported to be a total loss.

The steamer Edward Smith which left Buffalo with the consorts Iron City and Grace Holland in tow was obliged to put back for repairs to her wheel.

Negotiations are under way between the Turbine Steamship Co. of Hamilton and the Toronto ship yards, which have taken over the old Bertram yard, for the construction of a steamer for the run between Toronto and Hamilton. The plans as drawn call for a vessel 200 ft. and 30 ft. beam.

All of the special pilots, including Secretary Marr, of the Lake Carriers' Association, who went from Cleveland and other ports to the West Neebish channel to pilot vessels through the channel have now returned home, Secretary Marr reaching Cleveland on the steamer J. H. Sheadle.

Capt. James Davidson, of Bay City, says that he will send the new steamer Honduras to the Atlantic coast this fall for service between New York and the West Indies.

The steamer Hoover and Mason went aground at the head of Stag Island, St. Clair river, last Monday night. The wrecking tugs, Favorite and Harding and the lighter Rescue went to her relief.

The passenger steamer King Edward of the Algoma Central Steamship Co.'s fleet ran on a reef at the south end of Chantry Island while enroute from Sandusky to the Sault. Distress signals were sounded and Capt. McIvor, keeper of the lighthouse on Chantry Island, went to the mainland and notified the life savers. The passengers were taken off by the fish tug McLeod. The King Edward was built in Great Britain in 1891. Capt. C. H. Sinclair, of Detroit, went to the wreck as a representative of the underwriters. It is reported that the boat may be a total loss.

The steamer W. B. Kerr was damaged to the extent of about $10,000 in a collision with the steamer Buffalo of the Western Transit Co.'s fleet at Duluth last week. The Buffalo was endeavoring to make the turn in the channel to get over to the Northern Pacific dock No. 2 when she collided with the Kerr. The accident was attributed to the fact that the current was stronger in the channel than usual.

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Accidents of a Month.

The accompanying summary of vessel accidents on the lakes for the past month shows that during that period three vessels were put out of existence, the tug Tom Dowling and the steamers Oregon and Chauncey Hurlbut. The Dowling and Oregon were both destroyed by fire and the Hurlbut was wrecked during a storm on Lake Superior. Two lives were lost, one on the steamer Lelaunau by the explosion of her boiler, and the other on Lake Michigan when the barge Baldwin capsized. Four collisions occurred, the most disastrous being the W. B. Kerr-Buffalo collision at Duluth, on Sept. 1. The steamer Neepawah which ran ashore at Otter Head, Lake Superior, and was damaged to the extent of $25,000 and the barge Carrington which crashed into the Grand Trunk dock in the St. Clair river also figure prominently in this summary.

DATE.	NAME OF VESSEL.	NATURE OF ACCIDENT.	PLACE.
Aug. 9	Str. City of Montreal	Collided with schooner Rapid City	Toronto.
Aug. 9	Sch. Rapid City	Collided with steamer City of Montreal; considerably damaged	Toronto.
Aug. 11	Str. Hawk	Stranded; released, uninjured	Lake Michigan.
Aug. 12	Str. City of New Baltimore	Ran ashore in storm; released on Aug. 13; upper works badly torn	Pt. Lookout, Saginaw Bay.
Aug. 12	Str. Wahcondah	Ran ashore; released and taken to Montreal; not damaged	Farran's Point, Lake Ontario.
Aug. 13	Str. Strathcona	Ran aground; released, uninjured	Sarnia, Ont.
Aug. 14	Bge. Gawn	Mast struck by lightning and broken off	Limekiln Crossing.
Aug. 15	Bge. Uranus	Sprang a leak; beached	Lake Erie, off Put-in-Bay.
Aug. 17	Tug Tom Dowling	Caught fire while lying at dock; sank; total loss	Ashland.
Aug. 17	Str. State of New York	Struck by lightning; flag pole and portion of rail torn away	Saginaw Bay.
Aug. 17	Str. Leelanau	Boiler exploded; top of engine blown off and pilot house and upper works demolished; 1 life lost	Grand Traverse Bay.
———	Str. Mariska	Struck a log; lost her shoe; docked at Cleveland for repairs	Lake Superior.
Aug. 19	Bge. Adiramld	Sprang a leak in midlake; went to Harbor Springs, where she sank in 20 ft. of water	Lake Michigan.
Aug. 19	Str. D. M. Whitney	Lost her anchor	Lake Superior.
Aug. 19	Str. Helen C	Ran ashore; released on Aug. 21; repaired, receiving new stem, new forefoot, new piece of keel, as well as recalking	Lake Huron, near Cheboygan.
Aug. 20	Str. Neepawah	Ran ashore; released and towed to Great Lakes Engineering Works yard for repairs; bottom very badly damaged; damage estimated at $25,000	Otter Head, Lake Superior.
Aug. 20	Tug Seagel	Steam pipe burst; steamer slightly injured	Detroit river.
Aug. 21	Schr. Jessie Martin	Became water-logged; broke in two; abandoned	Lake Michigan.
Aug. 22	Bge. Annabel Wilson	Hit by steamer Mohegan; stern crushed in; damage estimated at $2,000	Sturgeon Bay.
Aug. 22	Three scows	Struck by a squall and broke away from Tug Lee which towed them; ran hard aground; released on Aug. 26	Van Buren Pt., Lake Erie.
Aug. 24	Str. Oregon	Ran aground and then caught fire; part of cargo saved; vessel total loss	Diment Shoal, North Channel.
Aug. 25	Str. Legrand S. Degraff	Ran aground; released on Aug. 27 after lightering 750 tons of cargo; one plate cracked; leaked slightly; docked at Lorain for repairs	Windmill Pt., Lake Erie.
Aug. 25	Str. Plow Boy	Ran aground; released, uninjured	Entrance to Portage Lake.
———	Steel dump scow	Ran on rock and partly sank	Snear Island, Detroit river.
Aug. 27	Bge. Baldwin	Turned turtle; one member of crew lost	Lake Michigan, off Twin River Pt.
Aug. 27	Str. J. W. Westcott	Stranded; released on Aug. 31; rudder lost; towed to the Sault	Drummond's Island, North Channel.
Aug. 29	Str. Iron King	Stranded on rock; released, uninjured	Detroit river.
Aug. 30	Str. Rosemount	Stranded in fog; released, uninjured	Round Island.
Aug. 30	Str. Caribou	Stranded in fog; released, uninjured	Canadian Sault Canal.
Aug. 31	Bge. Carrington	Wheel chains parted and she crashed into new dock of Grand Trunk railway; large hole in bow and both anchors lost; towed to Conneaut and later taken to Cleveland for repairs; one anchor recovered Sept. 6	St. Clair river.
Sept. 1	Str. Telegram	Stranded; passengers and crew taken off; vessel probably pounded to pieces	Jackson Shoal, Georgian Bay.
Sept. 1	Str. W. B. Kerr	Collided with steamer Buffalo; nearly cut in two; taken to Superior ship yard for repairs	Duluth.
Sept. 1	Str. Buffalo	Collided with steamer W. B. Kerr; very badly damaged; went to ship yard before continuing her voyage	Duluth.
Sept. 1	Str. Benton	Unshipped her rudder; docked at Detroit for repairs	River Rouge.
Sept. 2	Tug James P. Donnelly	Became disabled; stopped at Ashtabula for repairs	Lake Erie.
Sept. 3	Str. Missouri	Ran aground; released; slightly damaged	Three Mile Pt., Lake Michigan.
Sept. 3	Str. Thos. F. Cole	Ran aground, owing to low water and heavy gale; released by tugs, uninjured	Rice Point Channel, Duluth.
Sept. 4	Schr. Garibaldi	Became water-logged	Lake Huron.
Sept. 4	Str. Saxonia	Lost her wheel	Lake Huron.
Sept. 4	Tug R. H. Hebard	Caught fire while lying at dock at Middleport; badly damaged; repaired at Tonawanda	Middleport.
Sept. 5	Str. King Edward	Ran ashore; filled with water; probably total loss; passengers taken off by a tug	Charity Island, Lake Huron.
Sept. 6	Str. Chauncey Hurlbut	Machinery disabled in storm; sprung a leak; beached; total loss	Lake Superior, near Whitefish Pt.
Sept. 6	Bge. D. K. Clint	In tow of steamer Chauncey Hurlbut when she was beached; picked up by steamer Lackawanna in water-logged condition with rigging gone and beached behind White Fish Point	Lake Superior.
Sept. 6	Str. Wonder	Ran aground	Lake Erie, near Ashtabula.
Sept. 7	Str. Amasa Stone	Collided with steamer Edwards; not damaged	St. Clair river.
Sept. 7	Str. Edwards	Collided with steamer Amasa Stone; not damaged	St. Clair river.

The Italian admiralty is engaged in making preparations to extend a hearty welcome to the American battleship fleet under Admiral Sperry when it passes through the Mediterranean on its return voyage. The Dukes of Genoa and Abruzzi and Prince Ferdinand d'Udine, the eldest son of the Duke of Genoa, have been appointed to receive the visitors officially.

One of the anchors which the barge Carrington lost in the St. Clair river opposite Port Huron has been discovered by Capt. J. Bell.

The Canadian grain exchange is now located in its new building at Winnipeg where its facilities are of the best.

The Russian government is doing all in its power for the advancement of Russia's shipping. It is proposed to expend some 5,000,000 roubles on an extension of the Odessa Harbor, and a congress will be held at St. Petersburg towards the end of the year in the interests of Russian commercial shipping, where ship owners, ship builders, etc., will be represented.

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DULUTH STEEL PLANT AND BELT RAILWAY.

In connection with its proposed steel works at the head of Lake Superior the United States Steel Corporation has planned a belt railway line for the Duluth and Superior terminal system that will not only give it access to every railway that now enters, or will in future enter, the region, but will provide ample room for any manufacturers that may wish to avail themselves of the raw-steel products to be rolled at its works.

Three railway incorporations have been made, which cover the situation. Combined, these will leave the line of the Duluth, Missabe & Northern, which is the steel corporation's road from the Mesabi range to Duluth, at the village of Adolph, and will follow an old and abandoned grade built by the Duluth & Winnipeg to the site of the proposed works; it will cross the St. Louis river into Wisconsin, run back of the city of Superior, crossing every road to the head of the lakes but two or three that come in on the Minnesota side, and will swing around to the base of Wisconsin point, running up that stretch of land to its end.

There will be about 30 miles of road, and a large double-deck swing bridge across the upper part of the harbor. Congress has already authorized this bridge. The road will not only be a great convenience to the steel company, relieving it of all danger of delay from congested traffic in city terminals, which is a constantly growing evil, but will enable it to assist other roads, at profit to itself, in handling their transfer and terminal freights. The construction of this road has begun and will be pushed to completion, as it is hoped to have it running this year.

Operations on the Minnesota Steel Co.'s works so far have been merely preliminary, but it is expected that before the close of the summer activity will be more marked. So far the Steel Corporation has not definitely decided as to the extent of the Minnesota Steel Co.'s operations, but the original plans have already been found too small, and the works will probably be of fair size.

ANDERTON BOAT LIFT.

The Anderton boat lift, the noted lift of the hydraulic plunger type on the river Weaver in England, has been displaced by an electrically operated lift designed by J. A. Saner, chief engineer of the River Weaver Navigation. The original lock had two chambers, each operated by a hydraulic ram; the two were so connected that one practically balanced the other so that little power was required to operate them. The lift was designed by Sir E. Leader Williams in order to avoid taking water from the high level and to save a large part of the space needed by a flight of ordinary locks to surmount a rise of 50 ft. It was found lately, however, that the canal water had corroded the rams to such an extent that it would be necessary to replace them, which would make it necessary to close the lift for some time and would not do away with the probability of future repairs of the same sort, or else to substitute some other method of operation. The latter alternative was adopted and the alterations have been made without any material interference with traffic. Each lock chamber is counterbalanced and operated independently by electrically driven apparatus, which has now been tested long enough to demonstrate that it will be successful.

OPENING OF COLLIER BIDS.

The opening of bids for furnishing three colliers for the United States navy, under the readvertisement, occurred Sept. 1 at Washington.

The Massachusetts Steamship Co., which on the former call for bids offered its three colliers, Everett, Malden and Melrose for $525,000 each, did not enter the second contest.

The bid of the Maryland Steel Co., Sparrow's Point, Md., provides for: Class 1, government specifications, one collier, 7,200 tons, 12 knots speed, $490,000; two colliers, $482,500 each; three colliers, $479,600 each; time to complete, first vessel 10 months, second vessel 11 months, and third vessel 12 months. Class 2, bidder's specifications, one collier, 7,200 tons, 12 knots speed, $510,000; two colliers, $501,500 each; three colliers, $498,600 each; time to complete, first vessel 10 months, second vessel 11 months, third vessel 12 months.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., submitted a bid for constructing three colliers of 7,200 tons each, with a speed of 12 knots, for $524,000 each, the first vessel to be completed in 12 months, the second in 13 months and the third in 14 months.

The bid of the New York Ship Building Co., Camden, N. J., provided for the construction of one collier of 7,200 tons, 12 knots speed, for $590,000, two such vessels for $575,000 each, or three at $570,000 each, deliveries to be made in 12, 13 and 14 months.

The William Cramp Ship & Engine Building Co., Philadelphia, Pa., submitted a bid of $525,000 each for one, two or three colliers of 7,620 tons and 12 knots speed, delivery to be made in 12, 13 and 14 months respectively.

SIDEWHEELERS VS. SCREW PROPELLERS.

There recently appeared in the *New York Times* an inquiry from Willard F. Ball, under the caption: "Sound and Bay Steamers—Why is it that the Fall River Line steamers are sidewheelers and not screw propellers?" J. W. Miller, vice president of the New England Navigation Co. replied to it as follows:

"This question has often been asked, and due thought was given to it by the management of this company prior to the construction of the Commonwealth. The problem may be briefly presented as follows:

"To construct a 'six-story floating hotel' with a length of two New York City blocks and a width of about half a block, upon a foundation limited to not over 15 ft. in depth; to make this hotel of an average speed, safe against collision and fire—on a route where fogs are prevalent, sea room restricted, and a larger portion of the course in normally smooth waters.

"The side-wheel mode of propulsion with feathering paddles fulfills these requirements; the guards and wheels protecting the hull in case of collision, while insuring a stability which cannot be obtained from propellers on a draught limited by the depth of the channels into our eastern termini. The great beam further enables the utilization of much greater lateral space for outside staterooms, a requisite essential to the traveling public making a one-night trip, and who will not stand either the shake of a propeller or tremor of a turbine. The inclined engine, as developed on board the Commonwealth and Priscilla, makes a motionless boat, the action of the engine being scarcely apparent, and the rolling of the ship off Point Judith reduced to a minimum.

"The needs of the Fall River Line do not require the use of the hold amidships for freight or passengers, whereas a shaft would interfere materially. A further and most important factor is that the immense power of the side-wheel engine and wheels can be exerted almost instantaneously to stop the headway of the ship, a most essential requirement on Long Island Sound, where craft of all descriptions are met in all sorts of weather.

"By inference, your correspondent

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compares the steamers of the Fall River Line with the Sandy Hook and other vessels plying on daylight routes. If he or any of your readers care to lie in a berth on board such light draught and lightly built propellers he will quickly see how unfit they are for night service, being built for inland navigation, while the Sound line steamer necessitates a much stronger construction.

"In the case of the Commonwealth it includes a double bottom, eight water tight compartments with no doors in them, two fire bulkheads extending from the hull to the upper deck, a sprinkler system consisting of 1,800 outlets in all parts of the ship, numerous thermostats, and the lining of the freight deck with iron, all of which means weight which could not be carried on a vessel of the length of the Commonwealth— which is 456 ft.—if the form of hull necessary for a 15-ft. propeller ship has been used. The length of the Priscilla is 440 ft. 6 in.; her horse power is 8,500. The length of the Providence is 397 ft.; her horse power is 5,500. The horse power of the Commonwealth is 11,000. The length of the Plymouth is 356 ft.; her horse power is 5,000.

"Finally, the experience of 30 years has proved the value and economy of the inclined engine for safety, comfort, and efficiency on a line over which abnormal speeds are not required, and where engine space is not restricted."

QUESTIONS FOR MASTERS AND MATES.—NO. 11.

160. Name the principal parts of the mariner's compass.

161. Why is the bowl of the mariner's compass filled with liquid?

162. What kind of a compass is a Ritchie compass?

163. What kind of liquid does its bowl contain?

164. Can you see the magnets of a Ritchie compass?

165. How would you expel an air bubble in a Ritchie compass?

166. Where is the expansion chamber of a Ritchie compass?

167. What is the object of the expansion chamber?

168. What kind of packing is used to make the glass top of a Ritchie compass perfectly air-tight?

169. What is spirits of wine composed of?

170. Does extreme heat affect a compass? What is the effect?

171. What effect does extreme cold have on a liquid compass?

172. What are the essentials of a good compass?

173. How should a compass behave in a sea-way?

174. Can you see the magnets of a Baker compass through the glass top?

ANSWERS TO QUESTIONS FOR MASTERS AND MATES.—NO. 11.

160. Bowl, card and magnetic needles.

161. To keep the card from flying round in a seaway. The liquid floats the card and magnets and reduces the friction on the pivot to the minimum, thus rendering the compass the more sensitive.

162. A liquid compass with the magnets sealed in water-tight receptacles.

163. Spirits of wine.

164. No, only the receptacles that contain them.

165. Unship the bowl from the gimbal ring and remove false bottom so as to expose the expansion chamber. Now turn compass bowl on edge with the filling hole up, and keeping a slight pressure on expansion chamber with the finger, loosen up filling hole screw and let the air escape around the threads. If necessary, remove the screw and pour in a mixture of equal parts of pure alcohol and distilled water to running over point, then replace the screw keeping a slight pressure on the expansion chamber.

166. Next to the bottom of the compass bowl. The bottom of the bowl is weighted with lead to add weight to the bottom so as to make it ride horizontally. This weight or cap is screwed to the bottom of compass bowl and when removed exposes the expansion chamber. This false bottom also acts as a protection to the chamber.

167. It keeps the bowl constantly filled and permits expansion and contraction due to change of temperature without injury to parts. Also prevents bubbles in the contraction of the liquid.

168. Gum rubber.

169. Forty-five per cent of pure alcohol and 55 per cent of distilled water thoroughly mixed.

170. Yes, it tends to decrease the magnetism.

171. It makes it more sluggish by increasing the density of the liquid.

172. The pivot should be accurately centered in the bowl. The jewel for balancing the card should also be accurately centered, likewise the directing magnets, said magnets to be exactly parallel with north and south on card. The entire instrument should be in perfect balance.

173. It should be steady and not move when the boat rolls and pitches, except when the ship changes the direction of her head.

174. Yes.

ITEMS OF GENERAL INTEREST.

The American Ship Windlass Co., Providence, R. I., was the only bidder for furnishing the Panama canal commission with one small steam windlass with 60 fathoms of suitable stud link chain. The bid was $400 for the windlass and $90 for the chain.

The Walter R. Horning Co., engineers, Cleveland, O., have issued a folder descriptive of their multipolar motors. The component parts of the motor are separately described, three excellent halftons being used to illustrate the reading matter. A special price list for a period of sixty days on a lot of one hundred motors is given, and anyone interested would do well to write for this circular.

The gunboats Paducah and Dubuque have each reported the loss of a propeller within the space of a week. This is quite an unusual accident, although in the case of the gunboats would not prove serious as both are twin screw vessels. The Paducah dropped her port propeller while one day out from Hayti for New York on Aug. 19, while the Dubuque lost her starboard propeller in Long Island Sound Aug. 25. Both vessels will be fitted with wheels at the New York navy yard.

Admiral George Dewey on Aug. 26 unveiled the bronze tablet which has been placed on the commandant's house at Portsmouth navy yard where Farragut, first admiral of the American navy, died. The tablet was draped with the flag which Farragut flew on his last voyage on the Tallapoosa, which ship brought him to the yard in 1870. The inscription on the tablet reads: "Died in this house, Aug. 14, 1870, David Glasgow Farragut, Admiral United States Navy, Faithful and Fearless."

Director Grady, of the department of wharves and docks of the city of Philadelphia, has filed a report of the trip which he made abroad to inspect the docking facilities of the great European ports. Among the cities visited were, Genoa, Cherbourg, Southampton, London, Liverpool, Manchester, Avonmouth, Bristol, Hamburg, Antwerp and Rotterdam. The immensity of the modern warehouses, the frequent use of electric and hydraulic machinery for loading and discharging cargoes, granite and concrete bulkheads replacing wooden ones, and most of all the constant trend toward modernization of the foreign seaports attracted his notice.

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MERCURIAL AND ANEROID BAROMETERS.

(Continued from Aug. 27.)

Probably the best way of obtaining a fundamental knowledge of the constitution of storms and of the nature and behavior of the gales which attend them, is by reviewing the characteristic features of a well developed storm passing over the great lakes and the surrounding regions. These features are best illustrated by a series of successive charts, showing the development of a storm and the changes in the atmospheric pressure, temperature, and general meteorological conditions during the advance.

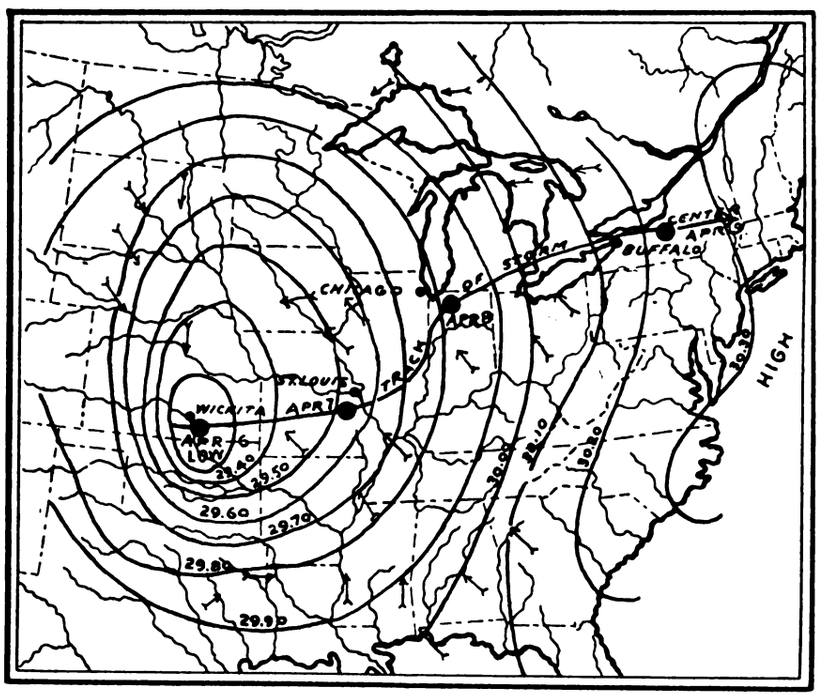

CHART OF STORM.

For this article we will take the storm of May 27 to May 30, 1896, on the great lakes. The charts appended are based chiefly upon the reports returned to the hydrographic office from lake observers, and present a general view of wind and weather at 6 a. m. (central standard time) each day during the storm's continuance. The center of the small circle at the head of each arrow marks the position of the observing vessel, and the attached number, by reference to the list, serves to identify it. For the construction of such charts, it is necessary that all barometric observations be reduced to the same level, the level of the sea being universally adopted for this purpose. Accordingly, to each barometer reading the correction for the height of the several lakes above sea level, as given in a previous table, has been added, before plotting it upon the chart.

The storm was first reported May 27, at 8 a. m., Washington time, as a moderate depression central over the state of Kansas, therefore outside the limits of the chart of that date. At 8 p. m. of the same day its eastward motion had carried the center as far as southeastern Iowa, and it was while in this neighborhood that it gave rise to the tornado which devastated the city of St. Louis, on the afternoon of May 27, the latter occurring as a suddenly-formed and very deep, secondary depression, which appeared about 200 miles to the southward of the main storm center.

The following is a list of the vessels upon whose observations the present charts are based:

1. Str. A. D. Thomson.
2. Str. Alaska.
3. Str. Charles Hebard.
4. Str. Chemung.
5. Str. Chili.
6. Str. City of Genoa.
7. Str. Corsica.
8. Str. Delaware.
9. Str. David W. Rust.
10. Str. G. J. Gould.
11. Str. George W. Roby.
12. Str. G. W. Smith.
13. Str. Harlem.
14. Str. Henry Chisholm.
15. Str. Hudson.
16. Str. Hesper.
17. Str. J. J. McWilliams.
18. Str. J. H. Outhwaite.
19. Str. Japan.
20. Str. John C. Gault.
21. Str. John Martin.
22. Str. John Oades.
23. Str. John Feddy.
24. Str. Joliet.
25. Str. Juniata.
26. Str. Manhattan.
27. Str. Maritana.
28. Str. Michigan.
29. Str. Nebraska.
30. Str. Oceanica.
31. Str. Osceola.
32. Str. St. Lawrence.
33. Str. Saranac.
34. Str. Scranton.
35. Str. Silvanus J. Macy.
36. Str. Spokane.
37. Str. Susquehanna.
38. Str. Tacoma.
39. Str. Tampa.
40. Str. Tioga.
41. Str. Waverly.
42. Str. Yakima.

The chart of May 27 shows an area of barometer very slightly below the average prevailing over the upper lakes, with light easterly winds and a covering of dense cloud over Sault Ste. Marie river, and the southern part of Lake Superior. At its western extremity the A. D. Thompson (1) and the Osceola (31) reported falling barometers, NE winds, of force 5 and 6, with rain, while observers near Keweenaw Point had lighter easterly winds and fair cloudy weather; conditions sufficient to announce to mariners on this lake that a depression was approaching which would probably pass to the southward. Over Lake Huron there were very light easterly winds and partially cloudy weather. Over the lower lakes wind and barometer were normal, the position of the storm center, in northern Kansas, being at the time represented by the chart at so great a distance that its disturbing effects did not extend to these lakes.

The depression approached rapidly during the 27th, deepening as it advanced. The weather on Lake Michigan during the day is thus described by the observer on the steamer Tioga (40): "Experienced good weather with light winds throughout the day; at 8 p. m. of the 27th wind freshened up from N. E. with heavy rain, thunder, and lightning; about 5 a. m. of the 28th. wind hauled N. W., strong and increasing in force; heavy sea making; barometer dropped very low; at 5 a. m. it stood 28.83."

The report of the "Tampa" (39)

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states: "Weather cloudy, with variable winds, backing from S. E. at noon of 27th to north; raining from 7:45 p. m., wind increasing in force from 10 p. m. At time of taking observation (6 a. m. of the 28th), wind, sea, and rain are increasing in force, and still backing to the westward."

It is evident from the shifts of the wind here described that the storm center passed to the southward of both of these vessels.

The chart for 6 a. m. of May 28 shows the storm central along the west shore of Lake Huron, the following low barometric readings (unreduced) being obtained in that region: Str. Delaware, (8) off Point Aux Barques, 28.62 in. (reduced reading 29.24 in.); Str. Nebraska, (29) latitude 44 degrees 45 minutes, longitude 83 degrees 00 minutes, 28.70 in. (reduced reading 29.32 in,); the Saranac, (33) off Forty-mile point, 28.65 inches (reduced reading 29.27 in.); Str. Hudson, (15) 2 miles off Presque Isle, 28.75 in. (reduced reading 29.37 in.) The shifts of the wind reported by these vessels, all of them immediately in advance of the storm center are characteristic. Thus, in the case of the Delaware (8), this vessel lying to the southward of the storm track, we should, in accordance with the law of the rotation of the winds stated above, expect the wind to veer steadily to the westward as the storm center approached; this is fully borne out by the report of her captain, as follows:

"At 9 A. M. of May 28 (three hours after the chart) the wind hauled to the south, remaining there about 30 minutes; it then gradually shifted to SW., with a force of about 7; after 12 o'clock, noon, it shifted to the west, and at 5 P. M. it was blowing from WNW., with a force of 8 or 9."

The winds experienced by the Saranac (33) show that she also was left to the southward, but from the suddenness of the shift at the time of lowest barometer, the wind at that time going from E. to W. by the south, it may be inferred that the storm center was close upon her. The report states:

"May 27, threatening weather, barometer falling all the while. May 28, 6 A. M., wind E., force 6; at 10 A. M. lowest barometer, 28.55 inches. At 10:40 wind hauled to SW., light; at 11:30, W., blowing hard; at 12 noon, NW., heavy gale."

A comparison of the reports of the Nebraska (29), and the Hudson (15) is interesting, as showing to what extent the winds encountered may be influenced by the progress of the vessel itself. The two vessels were at the time represented by the chart within a few miles of each other, immediately in advance of the storm center, the Hudson going north, the Nebraska going south. The meteorological log of the former vessel states that the gale set in from the east at 10 P. M., May 27. The lowest point reached by the barometer was 28.69 inches (reduced reading, 29.31 inches), which was attained May 28, at 11 A. M., the vessel at this time being near Cheboygan. The direction of the wind at this time was NW., the wind having backed suddenly from east to north, at 10 A. M.; and then gradually to NW. The Nebraska, on the other hand, going southward experienced shifts exactly the reverse of these. Her report is as follows:

"At 9 A. M., May 27, wind NE., veering to east at 11 A. M., and to SE. at 4 P. M., from which point it continued to blow with increasing force until 4 A. M. of May 28. At 8 A. M., wind ESE.; shut in foggy at 9 A. M., and wind veered to SW."

Heavy gales prevailed during the entire day over all points of the lakes within 150 miles of the storm center, the general direction being NW. over Lake Michigan; NE. shifting later to NW. over Sault Ste. Marie, and the eastern portion of Superior, and SE. shifting rapidly to west, over Huron, backing or veering, according as the vessel was north or south of the storm track. The Corsica (7), off Summer Island, reported a NNE. gale of force 11, with heavy rain; the G. J. Gould (10), off Nine Mile Point, a NE. gale of force 11, shifting to NNW., at 11 o'clock A. M.; the G. W. Smith (12), bound north in Lake Huron, experienced an easterly gale of force 8, backing after the passage of the lowest barometer (28.70 inches at 10 A. M.), to a gale from NNW., of force 10; the Henry Chisholm (14), reports heavy rain with high winds from the SE. during May 27, on Lake Michigan, which had become a NW. gale of force 11 at 6 A. M., May 28.

Referring to the chart of May 28, the closeness of the isobars shows that as we leave the center, the rise of the barometer to the north and in advance of the storm was much quicker than to the southward and in the rear, the increase in the neighborhood of the Sault Ste. Marie river amounting to four-tenths of an inch in less than 100 miles. It is in this neighborhood, then, that we should expect the strongest winds to prevail, and the records of observers show that such was the case, all vessels in the Sault Ste. Marie river reporting NE. gales of force 8 to 11, backing about noon to NW. The circulation of the winds around the center is also plainly apparent; to the eastward, over Lake Huron, Lake Ontario, and a large portion of Lake Erie, the winds are uniformly southeasterly, but incline more to the south and southwest as the western end of Erie is reached. To the northward, over Sault Ste. Marie and Lake Michigan, high NE. winds prevailed, becoming northerly and northwesterly in the rear of the storm, over Lake Michigan. As the storm center advances into the Province of Ontario, during May 28, the whole lake region is left in its rear, and the winds shift steadily westward, those to the left of the track by backing, those to the right by veering, so that at 6 A. M. of May 29, the time represented by Chart III, we find the westerly, northwesterly and southwesterly winds proper to the rear of a depression covering the whole region. During May 29 the area of low pressure diminished and filled up, and the chart of May 30 shows the rapid return to the normal condition of wind and weather upon the lakes.

Barometric Depression of April 6, 1895, Central over Kansas.—The accompanying chart (Fig. 2), taken from the United States weather map of April 6, 1895, shows the presence of one of those barometric depressions, central over Kansas. The light lines are the isobars; at all points along any one of these lines the reading of the barometer at the hour represented by the chart, 8 A. M., Washington time, was identical. Thus the list of barometric readings published upon the map in question shows that at the several points, Huron, St. Paul, La Crosse, Davenport, Springfield, Ill., St. Louis, Little Rock, and Valentine, the height of the barometer was within a few hundredths of an inch the same, viz., 29.60, and upon drawing that isobar through these successive points, the fact at once becomes apparent that this line is an approximate circle; the same will be found to be true of the remaining isobars, 29.70, 29.80, etc.; and when all have been thus drawn, it will have become evident that the whole depression is nearly circular in shape, the center or point of lowest pressure being situated near Wichita, the reading of the barometer at that point being 29.20 inches.

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OBITUARY.

Rear Admiral Henry Glass died at Paso Robles, Hot Springs, Cal., on Sept. 1 at the age of 64. His death was the result of an operation which was performed about a month ago, and from which he failed to rally. Admiral Glass, who was at the head of the class at Annapolis which included Admirals Evans, Crowninshield and Hendrickson, was retired in 1906. He was born in Hopkinsville, Ky., Jan. 7, 1844, and was appointed to the naval academy in 1860. His first assignment was on the Canandaigua. He served on her with the South Atlantic blockading squadron in 1863. He was then transferred to the Pawnee. He finished the war on the Powhatan and the Dacotah. In 1868 he was promoted to the rank of lieutenant commander, and the next year was detailed to the Philadelphia navy yard. In 1874 he was placed in command of the schoolship Jamestown. In 1894 he was promoted to the rank of captain. When the war with Spain began, Captain Glass was transferred to the Philippines. As commander of the cruiser Charleston he convoyed the first troops to the Philippines. He was present at the battle of Manila Bay. In 1901 he was made rear admiral, and two years later was placed in command of the Pacific station, from which he was retired. Admiral Glass was the author of several works of military matters and was a member of the Loyal Legion, the Society of American Wars, the Society of Foreign Wars, and the University, Olympic and Union League Clubs of San Francisco.

BIDS FOR DREDGING PAMLICO SOUND.

Bids received by Capt. Carl I. Brown, corps of engineers, United States army, Wilmington, N. C., for dredging from Pamlico Sound to Beaufort Inlet, N. C., opened July 27, were as follows:

P. Sanford Ross, Inc., Jersey City, N. J.	$244,800
Maryland Dredging & Contracting Co., Baltimore, Md.	387,000
Atlantic Dredging Co., Philadelphia, Pa.	621,000
Coastwise Dredging Co., Norfolk, Va.	357,750
Sanford & Brooks Co., Baltimore, Md.	738,000
John Anderson, Gulfport, Miss.	423,000
Broderick G. Ross, Jacksonville, Fla.	178,200
Atlantic, Gulf & Pacific Co., New York, N. Y.	171,000
North American Dredging Co., New York, N. Y.	422,640

BIDS FOR RETAINING WALL.

Bids opened by the chief of the bureau of yards and docks, navy department, Washington, D. C., Aug. 1, for the construction of a continuation of the retaining wall and a pier in the reserve basin at the navy yard, Philadelphia, were as follows:

Lawler Bros. Construction Co., 13 Park Row, New York	$53,777.00
American Paving & Const. Co., 211 So. Ninth St., Philadelphia, Pa.	59,000.00
McGaw & Gray, Pennsylvania Bldg., Philadelphia, Pa.	74,200.00
Wm. Krug Const. Co., German-American Bldg., Philadelphia, Pa.	54,637.00
Phoenix Const. Co., 41 Park Row, New York	63,941.00
Blackstaff Engineering Co., 1332 Walnut St., Philadelphia, Pa.	71,000.00
Edward F. Fonder, Land Title Bldg., Philadelphia, Pa.	74,039.41

BIDS FOR COAL HANDLING PLANT.

Bids opened by the chief of the bureau of yards and docks, navy department, Washington, D. C., Aug. 1, for the construction of a coal handling plant for the power house at the navy yard, New York, were as follows:

Guaranty Constr. Co., 140 Cedar St., New York	$36,340.00
Charles O. Leuz, 66 Broadway, New York	49,553.00*
C. O. Bartlett & Snow Co., Cleveland, O.	21,354.00
Belmont Iron Works, 22d and Belmont Aves., Philadelphia, Pa.	26,480.00
Burgin Point Iron Works, 149 Broadway, New York	27,237.00
Link Belt Co., Philadelphia, Pa.	35,520.00
Dobbie Fdy. & Mach. Co., 82 Warren St., New York	30,209.65
Darley Engr. Co., 80 Broadway, New York	7,417.00*
William J. Haskins, 96 Liberty St., New York	27,644.00
G. & W. Mfg. Co., 26 Cortlandt St., New York	31,913.00
Conveying Machy. Co., 120 Liberty St., New York	41,669.43 39,179.75

*Modified proposal.

BIDS FOR QUAY WALL.

Bids opened by the chief of the bureau of yards and docks, navy department, Washington, D. C., Aug. 1, for constructing a steel and concrete quay wall and pier on timber piles and a steel and concrete coal shed at the naval station at Key West, Fla., were as follows:

Penn Bridge Co., Washington, D. C.	$253,439
W. W. Lindsay & Co., Harrison Bldg., Philadelphia, Pa.	284,900
Grant Wilkens, Atlanta, Ga.	270,600
Conveying Machy. Co., 120 Liberty St., New York	490,788
Snare & Triest, 143 Liberty St., New York	262,600

BIDS FOR REPAIRS TO LIGHT VESSEL.

Bids received by the lighthouse inspector at Baltimore, Md., July 27, for making repairs to light vessel No. 71, were as follows:

*Spedden Ship Building Co., Baltimore, Md.	$5,066.00
Skinner Ship Building & Dry Dock Co., Baltimore, Md.	6,619.00
Marine Railway, Mach. & Boiler Works, Baltimore, Md.	7,056.75
Chesapeake Marine Railway Co., Baltimore, Md.	7,256.00
Oliver Reeder & Son, Baltimore, Md.	7,391.00
McIntyre & Henderson, Baltimore, Md.	7,450.00
Booz Bros., Baltimore, Md.	7,606.00
Cathell Bros. & Co., Baltimore, Md.	8,500.50

*Accepted.

SALE OF ST. MARY'S AND SHEARWATER.

Bids opened at the navy department, Washington, D. C., on Aug. 5, for the purchase of the former training ships St. Mary's and Shearwater, were as follows:

ST. MARY'S.

J. H. Gregory, Perth Amboy, N. J.	$4,057.10
Thomas Butler & Co., Boston, Mass.	5,052.73

SHEARWATER.

Samuel B. Wilson, Philadelphia, Pa.	$1,536.00
Geo. Warrington, Washington, D. C.	751.00

BIDS FOR MARINE RAILWAY.

Only one bid was received by the chief of the bureau of yards and docks, navy department, Washington, D. C., for the construction of a marine railway at the United States naval station at Key West, Fla., as follows:

H. I. Crandall & Son, East Boston, Mass.	$25,100 18,500

BIDS FOR FLOATING DERRICK.

Bids opened at the navy department, Washington, D. C., Aug. 8, for the completion of a 15-ton floating derrick at the Puget Sound navy yard, were as follows:

Interstate Engineering Co., Bedford, O.	$334,726
Wellman-Seaver-Morgan Co., Cleveland, Ohio	250,000
Variety Iron & Steel Works, Cleveland, O.	243,800
Brown Hoisting Machy. Co., Cleveland, Ohio	240,000
Morgan Engineering Co., Alliance, O.	248,185

DAMS IN SOUTHWEST PASS.

Bids for sheet pile dams in outlet bayous of Southwest Pass, Mississippi river, La.:

Doullut & Williams, New Orleans, La.	$74,340.00
Constantin, Riess & Guerin, New Orleans, La.	68,917.90
Richard M. Murphy, New Orleans, La.	48,626.29
Peter Eskald, Biloxi, Miss.	47,300.00

BIDS FOR OHIO RIVER DAM.

Bids received at the U. S. engineer office, Wheeling, W. Va., Aug. 10, for building an abutment for dam No. 19, Ohio river, were as follows:

Pennsylvania Contracting Co., Pittsburg, Pa.	$19,366.50
Ohio River Contracting Co., Evansville, Ind.	18,991.50
Curtis & Shumway, Portsmouth, O.	18,094.50

SALE OF REVENUE CUTTER DEXTER.

Bids received at the division of revenue cutter service, treasury department, Washington, D. C., for the purchase of the revenue cutter Dexter, were as follows:

L. S. Collison & Son, Washington, D. C.	$ 925
Lee Kimball, Mobile, Ala.	2,775
Coastwise Dredging Co., Norfolk, Va.	2,750
John H. Gregory, Perth Amboy, N. J.	2,155

BIDS FOR ALTERATIONS TO DOCK.

Bids received by Capt. Willis C. Metcalf, quartermaster, U. S. army, Newport, R. I., opened Aug. 18, for alterations and additions to North Dock at Fort Adams, R. I., were as follows:

Roy H. Beattie, 57 North Main St., Fall River, Mass.	$11,456
Joseph C. Terry, 564 Durfee St., Fall River, Mass.	14,600
Darling & Slade, 56 North Main St., Fall River, Mass.	13,348
General Contract Co., P. O. Box 630, New Orleans, La.	15,380
John J. Fitzpatrick, 29 Hamilton St., Plattsburg, N. Y.	23,600
I. A. Scott Co., Inc., New London, Conn.	27,000

DAM NO. 19, OHIO RIVER.

Abstract of proposals for building abutment for dam No. 19, Ohio river, opened on Aug. 10, 1908, by Capt. F. W. Alstaetter, Corps of Engineers, U. S. A., at Wheeling, W. Va.:

Article—	Designation.	Quantity.	Pennsylvania Contracting Co., Pittsburg, Pa.	Ohio River Contract Co., Evansville, Ind.	P. P. Curtis, M. H. Shumway, Portsmouth, O.
Common excavation	Cu. yd.	3,500	$0.85	$1.00	$1.25
Rock excavation	Cu. yd.	195	3.50	3.00	2.00
Fill	Cu. yd.	1,900	0.95	1.00	0.50
Base for paving	Cu. yd.	270	1.75	2.50	2.00
Riprap	Cu. yd.	650	3.50	4.00	5.00
Concrete	Cu. yd.	1,140	9.75	8.50	7.50
Placing iron and steel	Pound.	1,200	0.02	0.02	0.03
Placing pipe and fittings	Lin. ft.	70	0.25	0.25	0.05
Total amount of bid			$19,366.50	$18,991.50	$18,094.50

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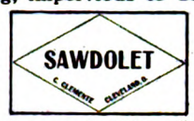

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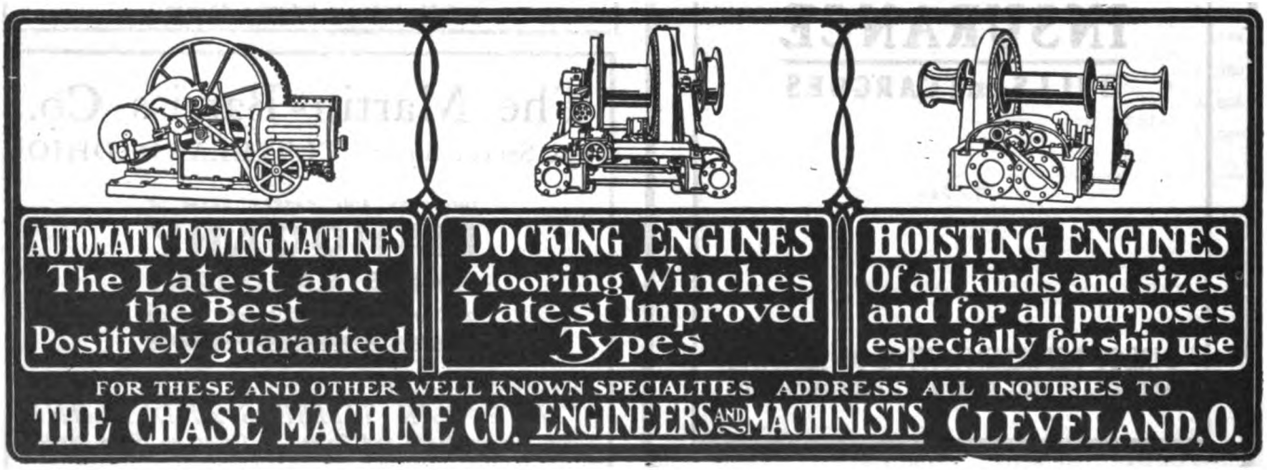
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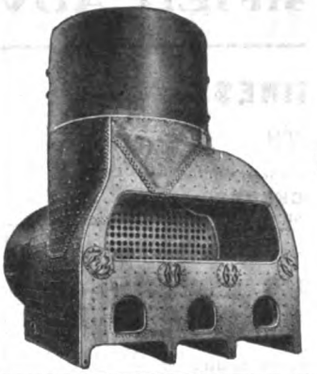

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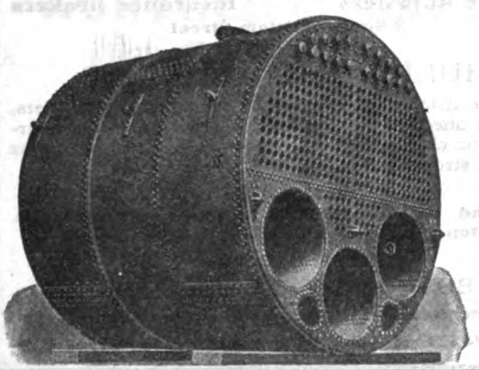

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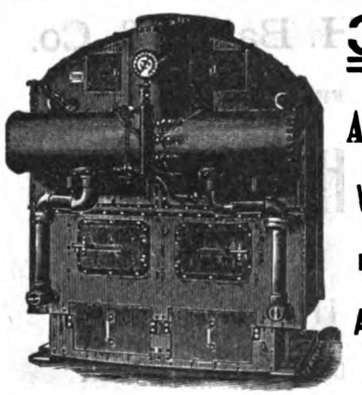

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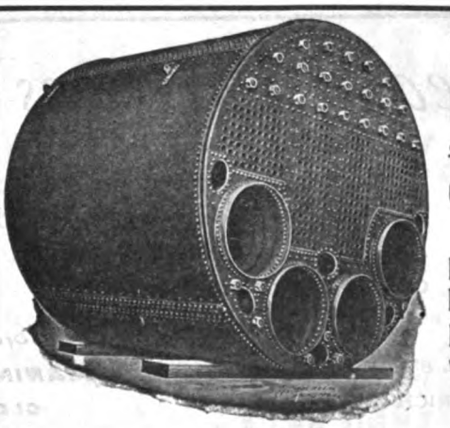

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